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SUMMARY OF RECENT ABSTRACTS *

I. CHOLERA †

Epidemiology

Pollitzer (p. 398) has continued his exhaustive study of the literature on cholera with a chapter on epidemiology and another on prevention and control. Man is the only host, and water is the usual vehicle, either because it is drunk or because it conveys infection to shellfish or to fruit and salads grown in association with it. A substantial proportion of patients may excrete the vibrio for 2 weeks and a few for as long as 4 weeks. Healthy contact carriers rarely excrete for as much as 10 days. Prevention includes general sanitary measures, and the author believes that the use of vaccine gives substantial protection for 6 months.

De *et al.* (p. 37) attempted to elucidate the epidemiology of cholera in Calcutta by questioning patients about their living conditions and environmental factors. 45 of 100 patients admitted direct or indirect contact with a cholera patient within a few days of onset, 41 had been exposed to common sources of infection (water, food) and only 14 could not suggest a source of infection. Early notification and admission to hospital, and the observance of general sanitary precautions, are advocated. Ho and T'ien (p. 887) discuss the epidemiology of cholera in China, and claim that throughout China, and even in Shanghai itself, cholera is an imported disease, every epidemic being attributable to a fresh introduction. They state that historical evidence does not support the idea that it has long been an endemic disease there.

The first 2 cases of El Tor cholera to be diagnosed in Java are reported by Gan *et al.* (p. 1108). The disease behaved like true cholera, with a

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1958, v. 55. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on cholera in this series, see the January issues of the *Tropical Diseases Bulletin* each year since 1939.

high death rate, but the organisms found were of the El Tor type. This finding indicates that the disease is not restricted to Celebes, but as yet there is no certain indication of the origin of these cases in Java, though importation from Celebes is possible.

Aetiology

Mukerjee *et al.* (p. 651) typed 200 strains of *Vibrio cholerae* with cholera phages. The phages fell into 4 groups and the vibrios were classified into 5 types according to sensitivity to these phages, but there was no relationship with serological sub-types. Only 10 of the 200 strains were found to carry phages. The authors propose to use this method of classification to trace the spread of infection in localized epidemics.

Burrows (p. 507) reports a study of the electrophoretic fractions of cell wall and intracellular substance of *V. cholerae* isolated at various stages of the disease. Burrows and Schlub (p. 764) show that *V. cholerae* contains antigens derived from cell walls and intracellular substance, and that they are distinct from O agglutinogens and can be demonstrated by passive haemagglutination.

Stored strains of *V. cholerae* tend gradually to lose toxicity, and Gallut (p. 271) suspected that this might be due to gradual transformation from smooth (S) to rough (R) forms. He was able in part to confirm this view by showing a rise in toxicity after elimination of R forms by anti-R serum, but this is not the whole process because the restoration of toxicity was only partial.

Mallik (p. 652) shows that *V. cholerae* is sensitive to the bacteriostatic and bactericidal action of tetracycline; no resistant strains were found.

Diagnosis: Clinical findings

The laboratory diagnosis of cholera is considered in detail by Burrows and Pollitzer (p. 888). Serological diagnosis may be useful for retrospective diagnosis and for epidemiological purposes, if H and O agglutinins can be detected. De *et al.* (p. 1224) have elaborated a technique by which this can successfully be accomplished.

The pale colour of the stools of cholera (rice-water stools) has been attributed to absence of urobilin, but Mallik *et al.* (p. 38) could not confirm this, since though virtually no faecal urobilinogen could be detected in the stools, the urine contained some, which must have been absorbed from the intestine. Failure to detect it in the stools is probably largely due to the immense quantity of fluid stool, and consequent dilution to below the point at which urobilinogen can be detected, and the change in intestinal flora may be responsible for a fall in production similar to that observed after treatment with chlortetracycline.

Having observed the tendency of blood from cholera patients to clot in the syringe during withdrawal, Chatterjee *et al.* (p. 765) determined the clotting time, finding it reduced, the decrease being inversely related to

the haematocrit and the blood specific gravity. With clinical improvement dyspnoea is often observed and this may be due to pulmonary embolism; femoral thrombosis and hemiplegia have also been observed.

Chatterjee and Das (p. 401) have used deoxycortone in association with saline infusion, and observed that it was very effective in preventing the hyperpyrexia which tends to develop after the infusion. In comment Walters refers to this as a most valuable addition to accepted therapy.

Control

Sir Leonard Rogers (p. 401) sums up 30 years of research on the control of epidemic cholera. He observed that in India great epidemics tend to occur when the absolute humidity of the air rises considerably above 0·400, and tend to occur in years following those in which there is failure of the monsoon—possibly because overcrowding in famine camps provides favourable conditions. Epidemics are also associated with the great religious pilgrimages, and to combat these he advocated, many years ago, compulsory vaccination, but this proved impracticable on religious grounds until recently, when it was adopted with remarkable results, the death rates being reduced down to one-ninetieth of previous figures. He (p. 505) corroborated his findings by study of the epidemiology of the disease in Burma, Thailand, Indo-China and China. Movements of large numbers of labourers from Bengal to Burma every year, and religious festivals in Burma, would explain spread in that country. The experience of Burma also corroborates the opinion that the disease tends to occur in years following those in which there is failure of the monsoon.

Experiments with a heated monovalent vaccine of *V. cholerae* indicated that in mice it gave substantial immunity when injected in 3 doses at intervals of 7 days or 24 hours or 5 hours. In rabbits the 7-day interval resulted in a higher initial titre of agglutinins than the other two (Khristova and Gylybov, p. 508). *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

Lejeune, P. Contribution à l'étude du paludisme endémique des villages riverains du Kwango. [**Study of Endemic Malaria in Riverine Villages in Kwango, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1958, Apr. 30, v. 38, No. 2, 195–210. [Numerous refs.]

In Kwango the rivers are fringed by secondary forest from 100 to 500 metres wide, surrounded generally by high grass plains flooded during

the rains, with eroded savannah on the higher ground. Most villages are within 600 metres of a river. Malaria is holoendemic with *Anopheles gambiae* as the most important vector.

The malarial conditions prevailing were surveyed by comprehensive examination of 418 subjects from 9 typical villages. All ages were included but only 41 were over 25 years of age. Parasitaemia, gametocytaemia, red blood cell count, haemoglobin, splenic index, average enlarged spleen, protein deficiency and presence of ankylostomes and other intestinal helminths were investigated.

The percentages of *Plasmodium* species found in positive cases were *Plasmodium falciparum*, 63·8; *P. malariae*, 13·4; *P. falciparum* and *P. malariae* together, 21; and *P. vivax* 1·5. *P. vivax* was found only in a few children between 2 and 6 years of age. Parasitaemia was relatively uncommon, 40%, below the age of 3 months and usually symptomless at this low age, indicating the presence of some tolerance premunition acquired through the placenta, unless, as proposed by Gilles [this *Bulletin*, 1957, v. 54, 921], parasitaemia increases with decline of foetal haemoglobin and production of para aminobenzoic acid by the developing intestinal flora. Between 3 and 6 months the rate rose sharply to 83·3%, as other workers have found also [this *Bulletin*, 1953, v. 50, 182, 596]. The maximum parasitaemia rate was found between 3 and 4 years, after which the rate declined slowly up to 10 years. The splenic index rose sharply to 84·6% between 9 and 12 months, and declined after 5 years. The average enlarged spleen figure was highest between 3 and 6 months, but varied between 2·5 and 2·9 at most subsequent ages. Overt malarial attacks and deaths due to malaria were commonest between 6 months and 4 years. The haemoglobin index was at its lowest between 9 and 12 months.

Discussing the causes of anaemia in the children, in whom overt kwashiorkor was rare, the author concludes that malaria is the main cause under 1 year, protein malnutrition from 1 to 3 years and thereafter ankylostomiasis. [All information is tabulated in a single, informative table. The length of the paper is accounted for by full discussion of the literature and of technique.] *B. B. Waddy*

Cannon, D. S. H. **Malaria and Prematurity in the Western Region of Nigeria.** *Brit. Med. J.* 1958, Oct. 11, 877–8.

Relationship between malarial infection of the placenta and the birth weight of the child was investigated in 392 single deliveries; women who had taken antimalarial drugs during the late months of the pregnancy were excluded from the sample. The WHO definition of a premature baby as one that weighs less than 5½ pounds at birth was accepted, with the reservation that the average birth weight of Nigerian babies is lower than that in many other countries. A piece of the maternal aspect of the placenta, taken immediately after delivery, was examined for

malarial parasites. 33% were infected. The percentages of premature babies in the infected and non-infected placenta groups were 37% and 12% respectively, the 25% difference being 3·4 times the standard error. The mean birth weight in the infected group was 11 ounces less than that in the non-infected group—5 lb. 12 oz. and 6 lb. 7 oz., respectively.

117 babies examined for congenital malaria were all negative. The presence or absence of sickle-cell trait made no significant difference to placental malarial infection. In 130 mothers analysed for relation of parity to infection of the placenta, the percentage of infection in primiparae, 62·5, was much higher than the overall rate of 33%.

B. B. Waddy

Lacan, A. Indices gamétocytiques et gamétocytométriques dans la transmission et la prémunition du paludisme. [**Gametocyte and Gametocytometric Indices in Relation to Transmission of** *P. falciparum*, **and Premunition**] *Bull. Soc. Path. Exot.* 1958, Mar.–Apr., v. 51, No. 2, 225–31. [11 refs.]

The study of the incidence and density of gametocytes in the blood of a population exposed to hyperendemic malaria is useful for determining the actual reservoir of infection, and such a study will indicate how the development of immunity affects the production of the sexual forms of the parasite.

Observations were made in 4 territories of French Equatorial Africa where the spleen rate of children was between 50 and 75% and where transmission occurred throughout the year. The study was confined to the gametocytes of *Plasmodium falciparum* and these were counted against the leucocytes which were assumed to number 7,000 per cmm. of blood. 9,643 blood films showed 891 infections with crescents, in a proportion of 3 macrogametocytes to 1 microgametocyte; the density varied from 1 to 940 per cmm.

The incidence per age-group is shown in a table, which also includes the gametocytometric index (the mean number of gametocytes multiplied by the gametocyte index). The gametocyte index (the percentage of persons showing gametocytes) reached its maximum at 9 months of age, remained at this height until the fifth or sixth year, when it dropped rapidly. The density of gametocytes, however, fell much earlier, about the second year, when premunition began to develop. Thus the clinical effects of the disease, and the reservoir potential, both diminish at about this time. Asexual parasites remain numerous but the organism seems to have lost its power of producing sexual forms. *P. C. C. Garnham*

Lacan, A. & Peel, E. *Plasmodium ovale* Stephens 1922 en Afrique Équatoriale Française. [*Plasmodium ovale* **in French Equatorial Africa**] *Bull. Soc. Path. Exot.* 1958, Mar.–Apr., v. 51, No. 2, 167–9.

This paper is of considerable interest to malariologists for two reasons: it discusses the vexed question of the incidence of *Plasmodium ovale* and *P. vivax* in tropical Africa (French Equatorial Africa) and it gives a method which at last seems to be effective for the restaining of old blood films. In 17,000 blood films, malaria parasites were found 6,000 times, the commonest species being *P. falciparum* and *P. malariae*, though the proportions varied in the different territories, *e.g.*, 77% *P. falciparum* and 23% *P. malariae* in the Gabon, and 61% and 39% of these species in the Tchad region. *P. ovale* was found 25 times and *P. vivax* 8 times. *P. ovale* was present only in children of 1 to 8 years of age, and the majority of the infections were from the Middle Congo in savannah country. *P. ovale* tends to occur in a focal distribution; for instance, in a single village this parasite was found in 8 out of the 43 children examined. *P. ovale* is usually accompanied by one or more of the other species of malaria parasites. The recognition of *P. ovale* depends upon good staining; if the blood films are old, or have had a long journey to the laboratory, staining may be of indifferent quality, and the following method was applied to improve the picture.

The film is restained in a Giemsa solution (1 drop to 1 cc. distilled water of *p*H 7·2) for 2 to 6 hours according to the age of the film. The film is then rapidly differentiated in a 1% solution of boric acid, when Schüffner's dots and Maurer's clefts again become visible, and a diagnosis is easily reached. By following such a procedure, additional infections of *P. ovale* and *P. vivax* were revealed. *P. C. C. Garnham*

Lachmajer, Jadwiga & Wegner, Zofia. Niektóre dane o *Anopheles maculipennis* Meig. w białowieży. [**Some Observations on** *Anopheles maculipennis* **Meig. in the Białowieża National Park**] *Przegląd Epidemiol.* Warsaw. 1958, v. 12, No. 2, 185–92, 1 fig. English summary.

Abul-Hab, J. K. **The Seasonal Occurrence of** *A superpictus* **Grassi and** *A. sacharovi* **Favre in Suleimaniya Liwa, North Iraq.** *Bull. Endem. Dis.* Baghdad. 1958, Jan., v. 2, Nos. 3/4, 152–65, 2 figs.

Anopheles superpictus, *A. sacharovi* and *A. maculipennis maculipennis* are the important vectors of malaria in northern Iraq, although the last species is restricted to higher altitudes in this region. Three villages, with spleen rates in children of 53–100%, in the Shahrazur plain were selected for study. Two of the three villages were treated with DDT (2 gm./square metre), and the other left unsprayed. Temperatures between May and October were from 20° to 35°C., with little rainfall in these months, and from November to April between 6° and 20°C., with a rainfall of about 40–220 mm.

During 1954 *A. sacharovi* was found indoors in every month of the year in the unsprayed village, with a peak of abundance during May to June and again in October. Larval breeding was recorded between May and September. The application of DDT in the other two villages in April was followed by the absence of adults in April and most of May, but adults were again found in houses in June and later in the year. Adults of *A. superpictus* were recovered indoors only between May and November, with a peak of abundance in July to September. Adults were found indoors in the sprayed villages from late May to late November, but the adult density was lower than that in the unsprayed village. Larval breeding was recorded between June and October. [There is no comparison of the numbers of adults caught in each village in previous years.] *B. R. Laurence*

Maffi, M. Contributo alla conoscenza della fauna anofelinica della Somalia. Nota preliminare. [**Preliminary Note on the Anophelines of Somalia**] *Riv. di Malariologia.* 1958, June, v. 37, Nos. 1/3, 73–5, 3 coloured figs. on pl. & 1 folding map. English summary (7 lines).

The following species of *Anopheles* are recorded from Somalia: *A. gambiae*, *A. funestus*, *A. coustani*, *A. nili*, *A. pharoensis*, *A. squamosus*, *A. rhodesiensis*, *A. demeilloni*, *A. d'thali*, *A. macmahoni*, *A. turkhudi*, *A. paludis*, *A. daudi* and *A. salbaii*. Short locality records are given for some of the species and the distribution of each species is shown on a map. *A. gambiae* is the more widely distributed species, being found in the south, along the inland border, and also in the north. *A. funestus* (*senso lato*) was also found both in the south and in the north. The breeding places of *A. pharoensis*, *A. macmahoni* and *A. d'thali* are illustrated by three colour photographs. *B. R. Laurence*

Sundararaman, S., Soeroto, R. M. & Siran, M. **Vectors of Malaria in Mid-Java.** *Indian J. Malariology.* 1957, Dec., v. 11, No. 4, 321–38, 1 map. [20 refs.]

Of 18 species of anopheline mosquito recorded from the Province of mid-Java, the common species in the coastal area are *A. sundaicus*, *A. subpictus subpictus* and *A. s. malayensis* and, in inland irrigated areas with much rice cultivation, *A. aconitus*, *A. barbirostris*, *A. vagus* and *A. s. malayensis*. Important malaria vectors are *A. sundaicus* and *A. aconitus*, the former breeding in lagoons and fish ponds, particularly on the north coast, and the latter in rice-fields, especially inland. The ubiquitous *A. subpictus subpictus* and *A. maculatus*, the latter not common, however, are considered secondary vectors. Details are given of infection rates for sporozoites, monthly incidence, breeding places and adult habits for these four vectors.

Resistance to DDT in *A. sundaicus* on the north coast was first reported in 1954 after 2 sprayings of houses per year in the preceding 3 years. Larval control with DDT (in oil) was also practised earlier. Resistance was observed later in other parts of the north coast, and was seen by DAVIDSON at Semarang in 1955, after 3 sprayings, to be 18 times normal. There has been no physiological resistance of this nature in *A. sundaicus* on the south coast even after 4 sprayings of DDT. But the mosquitoes now avoid contact with a lethal dose from treated surfaces by simply entering, feeding and leaving the premises with little or no indoor resting. This was noted first in 1954 and still prevailed in 1956, although previously they rested on the walls in considerable numbers. The authors accept this as a behaviouristic change. By 1957 *A. aconitus* had completely disappeared from treated houses. In view of the DDT-resistance in *A. sundaicus*, dieldrin at 0·5 gm. per square metre was adopted for sprayings from 1956 onwards on the north and the south coasts. Mosquito mortality of 100% is reported for 6 months after spraying; after that mortality was less complete. On the south coast, however, *A. sundaicus* continued to show avoidance of treated surfaces after dieldrin had been substituted for DDT. Further observations on this problem are in progress. Dieldrin had effected complete absence of *A. aconitus* from treated houses in one limited area available for observations on this species. *A. aconitus* has not shown resistance to either insecticide. Residual spraying has not yet been extended to areas typical for *A. maculatus*. *D. S. Bertram*

SEN, P. **Further Studies on Physico-Chemical Factors in relation to *Anopheles sundaicus* Breeding.** *Indian J. Malariology.* 1958, Mar., v. 12, No. 1, 71–4.

[See this *Bulletin*, 1939, v. 36, (136).]

JONES, J. C. **A Simple Method for sexing living *Anopheles* Larvae (Diptera, Culicidae).** *Ann. Entom. Soc. of America.* 1957, v. 50, No. 1, 104–6, 2 figs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1958, Sept., v. 46, Pt. 9, 133.]

Examination of third-instar larvae of *Anopheles quadrimaculatus* Say showed that over 90 per cent. of heavily pigmented larvae were females and 70–100 per cent. of very light ones were males. Larvae of intermediate pigmentation, which were the most numerous, might be of either sex. The sex of living fourth-instar larvae could be determined with complete accuracy for 2–3 days after the moult by examination of the imaginal antennal disks within the head capsule. These disks are larger and more fully differentiated in males than in females of the same age. With experience, it was possible to determine the sex of 2–3 fourth-instar

larvae in a minute. In recently moulted fourth-instar larvae, it was also possible to determine sex by examination of the reproductive organs. Both the gonads and the disks of the external genitalia are visible in males and not in females at this time, but they become obscured in one day. The morphology and the early development of the antennal disks are described. The sex of larvae in the first two instars could not be determined.

De Bustamante, F. M. Distribuição geográfica e periodicidade estacional da malária no Brásil e sua relação com os fatôres climáticos. Situação atual do problema. [**Geographical Distribution and Seasonal Periodicity of Malaria in Brazil and Its Relation to Climatic Factors**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Apr., v. 9, No. 2, 181–90, 1 map. English summary.

This paper provides a general account of vectors of malaria in Brazil, with special regard to their distribution in the territory in relation to factors affecting their biology. *Anopheles darlingi* is the most important vector, and the sole one along the major river courses extending inland. *A. tarsimaculatus* (= *A. aquasalis*) is the principal carrier in coastal areas except the south where *A. cruzii* and *A. bellator*, breeding in bromeliads, are vectors. *A. albitarsis* is a vector of minor importance in numerous places, sometimes as the only vector or with *A. tarsimaculatus* on the coast; it occurs throughout much of the country including places where malaria is absent. About 17 million persons live in the transmission area of *A. darlingi*, 7 million in coastal areas affected by *A. tarsimaculatus* (and, in part, also by *A. darlingi* and *A. albitarsis*) and about 1 million in areas of the two bromeliad-breeding vectors. In reviewing (in August 1956) the control of malaria in Brazil since 1945–46 when DDT was first introduced, the authors note the great reduction, in certain places approaching elimination, of malaria in many parts of the territory by residual spraying. Inaccessible areas still depended largely on drugs for control. Plans were in progress to develop the existing organization for malaria control into one for malaria eradication. *D. S. Bertram*

Schreiber, G. & Memoria, J. M. P. Alguns aspectos do problema do polimorfismo cromossômico e ecologia em anofelinos brasileiros. [**Aspects of the Problems of Chromosome Polymorphism and Ecology in Brazilian Anophelines**] *Rev. Brasileiro Malariologia.* Rio de Janeiro. 1957, Jan., v. 9, No. 1, 101–3.

The English summary appended to the paper is as follows:—

"The salivary chromosomes of two species of *Anopheles* (*A. argyritarsis* and *A. strodei*) have been studied at the Centro de Pesquisas de Belo Horizonte, do Instituto Nacional de Endemias Rurais (formerly 'Instituto de Malariologia'). *A. argyritarsis* is lacking any chromosome

mutations and *A. strodei* has many chromosome mutations (heterozygous inversions, translocations, asynaptic regions). The ecological distribution of the two species was analysed statistically and it seems clearly shown that *A. strodei* larvae prefer water richer in organic substances than *A. argyritarsis*. *A. strodei* presents a great variability in the architecture of egg shells. This fact is probably related to the chromosome polymorphism of this species. The high grade of heterozygosis in *A. strodei* is probably related to the wider ecological adaptation of this species."

GUEDES, A. da S., AMORIM, Eloisa M. & SCHREIBER, G. Análise dos cromossomos salivares em anofelinos brasileiros. [**Analysis of Salivary Chromosomes in Brazilian Anophelines**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, Apr., v. 9, No. 2, 247–50, 4 figs. (1 on folding pl.)

The English summary appended to the paper is as follows:—

"In the laboratory of Cytology and Genetics of the Research Center of Belo Horizonte (formerly Institute of Malariology) researches are carried on the salivary chromosomes of the following species of Anopheles: *A. argyritarsis*, *A. strodei*, *A. darlingi* and *A. noroestensis*.

"The salivary chromosomes map of *A. argyritarsis* (standard of the region of Belo Horizonte) is made and special emphasis is given to the 'bulbs' in the X chromosomes.

"*Anopheles strodei* is characterized by a great number of chromosome mutations (inversions and translocations) and a great number of asynaptic regions are present in all the chromosomes of the specimens of the region of Belo Horizonte.

"*Anopheles darlingi* and *noroestensis* from the distribution area of Bocaiuva, Minas Gerais, present also some heterozygotic inversions, the number and localizations of which are still under study."

ALVING, A. S., KELLERMEYER, R. W., TARLOV, A., SCHRIER, S. & CARSON, P. E. **Biochemical and Genetic Aspects of Primaquine-Sensitive Hemolytic Anemia.** *Ann. Intern. Med.* 1958, Aug., v. 49, No. 2, 240–48, 4 figs. [33 refs.]

SIRSI, M. & BAMI, H. L. **Some General Pharmacological and Acute Toxicity Studies on 1-p-Bromophenyl-2:4-Diamino-1:6-Dihydro-6:6-Dimethyl-1:3:5-Triazine Hydrochloride (M.I.S.11).** *Indian J. Malariology*. 1958, Mar., v. 12, No. 1, 57–65, 10 figs. on 4 pls. [16 refs.]

This metabolite of bromoguanide has shown promise in *P. falciparum* and *P. vivax* infections [see this *Bulletin*, 1956, v. 53, 973], and the authors therefore investigated its pharmacological properties, with the following results:—

" 1-p-bromophenyl-2:4-diamino-1:6-dihydro-6:6-dimethyl-1:3:5-triazine hydrochloride (an active metabolite of p-bromo analogue of proguanil) has an LD 50 of 1,500 mg./kg. body weight for rats by the oral route and 130 mg./kg. by the intraperitoneal route. Intravenous toxicity in mice (LD 50) is found to be 116·9 mg./kg. body weight.

" The drug lowers the blood pressure with an acceleration of rate and diminution of amplitude in respiration. The fall in blood pressure is probably due to a direct effect on the myocardium.

" Though more active against acetylcholine and barium induced contractions, the spasmolytic activity exhibited by the drug is likely to be non-specific in nature since the contractions induced by histamine are also neutralized. It exhibits neuromuscular blocking action of a low degree."

Mosna, E., Rivosecchi, L. & Ascher, K. R. S. **Studies on Insecticide-Resistant Anophelines. 1. Chromosome Arrangements in a Dieldrin-Selected Strain of** *Anopheles atroparvus*. *Bull. World Health Organization*. Geneva. 1958, v. 19, No. 2, 297–301. [12 refs.]

The chromosomes of fourth stage larvae of two strains of *Anopheles atroparvus* were compared by the authors. One of these strains has been maintained in the laboratory since 1935, additions being made in 1946. No DDT had been used in antimalarial campaigns in the places of origin of the stock, and it seems therefore that there was no previous selection pressure with insecticides. The other strain was obtained by submitting first and third stage larvae to sublethal dosages of dieldrin, each succeeding generation being reared from the survivors of the treatment. Difficulty in maintaining the selected stock, due to physiological disturbances in the adults, has meant that no constant concentration of insecticide was used between generations and at times the number of eggs was so small that no selection was possible. The larval LC50 of this strain was three times greater than the non-selected parental stock whose LC50 had remained remarkably constant over the years. As no discriminating dosage is mentioned it is questionable whether this is a true resistant strain or another case of vigour tolerance. The authors refer to the strain variously as " dieldrin-resistant " and—more often—as " dieldrin-selected ".

The Frizzi technique was used for the cytological examination, few preparations being illegible once a standard technique of rearing the larvae at a lower temperature was perfected. The larvae from the dieldrin-selected strain were not themselves exposed to dieldrin before cytological examination. The left arm of chromosome III only was examined and the results classified into three types, standard, heterozygous for an inversion and homozygous for the inverted order. The inversions were found in zones 44 to 48.

The results show that the dieldrin-selected strain was composed of more individuals with the heterozygous inversion arrangement than the non-selected parental stock—77·4% in the former and 20·8% in the latter. This is compared with similar work by D'Alessandro *et al.* [this *Bulletin*, 1958, v. 55, 1076] with a DDT-selected stock of *A. atroparvus* where again the heterozygous arrangement was favoured by insecticide selection. *C. Elizabeth Jackson*

Hamon, J., Eyraud, M. & Sales, S. Observations préliminaires sur la présence du gène de résistance au dieldrin chez *Anopheles gambiae* Giles dans des zones non traitées au dieldrin de la région de Bobo-Dioulasso (Haute-Volta, A.O.F.). [**Preliminary Observations on the Presence of a Dieldrin-Resistant Gene in *Anopheles gambiae* in Areas Untreated with Dieldrin in the Bobo-Dioulasso Area, Upper Volta, French West Africa**] *Bull. Soc. Path. Exot.* 1958, Jan.–Feb., v. 51, No. 1, 42–7.

Anopheles gambiae (females) were collected from huts in several villages of French West Africa at considerable distances from the area of the pilot malaria control project of Bobo-Dioulasso where DDT spraying has been in use since 1955. Some spraying with gamma BHC preceded the use of DDT. Some of the villages had been sprayed with DDT or gamma BHC but not since 1955.

The adult progeny of the females was tested for resistance to dieldrin by 1-hour contacts with 0·4 and 4·0% dieldrin solutions impregnated on paper. Percentage mortalities in 24 hours with 0·4% dieldrin ranged from 67 to 95, and from 83 to 100% with 4·0% dieldrin. Data are tabulated for each village, or group of villages. The results indicate the presence in *A. gambiae* in all the villages of resistance to dieldrin similar to the incompletely dominant, and monofactorial resistance to dieldrin of *A. gambiae* in Nigeria [this *Bulletin*, 1957, v. 54, 124, *bis*]. It was most marked in two villages treated two years before, one with gamma BHC, the other with DDT.

[See also *Ibid.*, 1958, v. 55, 1077.] *D. S. Bertram*

Christie, M. **Predation on Larvae of *Anopheles gambiae* Giles.** *J. Trop. Med. & Hyg.* 1958, July, v. 61, No. 7, 168–76.

"1. An attempt to study the survival of larvae of *A. gambiae* introduced as first stage larvae into semi-permanent pools, before and after removing the natural fauna, is described.

"2. Survival increased in one series of experiments from 3% under natural conditions, to 58% when the fauna had apparently been removed.

"3. In a second series of experiments in older pools, an improved design was tried out, in which a number of first stage larvae was introduced daily and the populations of larvae and pupae produced were

measured. Survival to pupation appeared to increase from nil to 7–20% when incomplete removal of the other fauna had been effected.

" 4. While these studies have given convincing demonstration of the great extent of predation, they have not made it possible to name the predators. Published methods of naming the predators of mosquito larvae are considered, and their limitations discussed.

" 5. Arguments based on the supposed habits of potential predators must be treated with great caution, but the Notonectidae are likely to prove the most important.

" 6. The populations observed have proved useful as models in speculating about the mechanism of natural control of adult populations of *A. gambiae*.

" 7. The possibilities of biological control are considered: these are not encouraging."

[See this *Bulletin*, 1955, v. 52, 120.]

Alves, W. **Malaria Parasite Rates in Southern Rhodesia: May–September 1956.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 1, 69–74.

After a sustained campaign of residual insecticide spraying in Southern Rhodesia of 7 years' duration, the tactical plan was changed to one which concentrated on the periphery of the area, leaving the centre untouched. As an additional safety measure, as many as possible of the inhabitants of the peripheral zone received a single dose of chloroquine during the period May–September 1956, and this dose was repeated during the same period of 1957. The dosage employed was 600 mgm. of chloroquine sulphate for adults, 400 mgm. for children and 100–200 mgm. for infants. At the time of chloroquine administration, thick and thin blood films were taken. A mosquito survey carried out in 1957 showed that larvae of *Anopheles gambiae* were to be found scattered throughout the country, but few adults were found within dwellings and there was little overt malaria.

For purposes of tabulation the population surveyed, which was entirely African, was divided into infants, from 1 week to 15 months of age, children, from 15 months to 17 years, and adults. Of the 36 areas covered, 11 areas appeared completely free from malaria. Positive films showed only scanty parasites, and gametocytes were found only in association with trophozoites. In the grand total, the incidence of parasitaemia in 2,700 adults was 1% and no gametocyte carriers were found. Among the 3,428 children examined, 1·8% showed trophozoites and 0·1% carried gametocytes, while among 1,566 infants 1·3% showed trophozoites and 0·19% gametocytes. These figures refer to *P. falciparum* only.

Previous surveys carried out between 1937 and 1948 provide a background against which the present situation can be contrasted. The

overall incidence of parasitaemia shown by the earlier surveys has been computed as:—*P. falciparum* trophozoites 43·2%, *P. falciparum* gametocytes 5·5%. other trophozoites 2%, other gametocytes 0·1%. The remarkable success of the spraying campaign is clearly evident, and the cycle of local transmission appears to be on the verge of cessation. [Since the films were taken at the time of chloroquine administration, the low rates of parasitaemia cannot be attributed to this therapy.]

There is a considerable risk of reintroduction of malaria from outside, however, since *A. gambiae* persists in widely disseminated though small foci, and a reservoir of parasites is provided by immigrant labourers and their families from Nyasaland and Mozambique, who show a high incidence of both trophozoite and gametocyte carriers. Efforts are being made to diminish this danger by dosing all immigrants with Camoprim, of which each tablet contains 150 mgm. amodiaquine and 15 mgm. primaquine.

[One hopes that a further assessment of the results of this most successful campaign will include a comparison of infant mortality rates before and after the period of residual spraying, and the overall effect on the population figures.] *J. H. Walters*

Hechter-Schulz, K. **Malaria Control in South Africa. How does the Changing Strategy in Malaria Control affect us?** *Med. Proc.* Johannesburg. 1958, June 28, v. 4, No. 13, 456–62.

For the last ten years DDT has been widely used as an imagicide for the control of malaria in South Africa till, in 1954, nearly two million people were protected at a cost of about 2/6d. per person per annum by the application of 2·2 gm. of the para′para isomer per square metre to 479,447 huts. The object, however, has been control and not eradication, and both marginal areas and small foci have been left untended and now constitute sources from which the disease could spread if spraying were to be discontinued. The author reviews the requirements to convert this control programme into an eradication scheme and concludes that with the provision of extra technical direction to strengthen survey and surveillance it should be possible to create an eradication scheme which would be effective and possible at a reasonable cost. *G. Macdonald*

Brink, C. J. H. **Malaria Control in the Northern Transvaal.** *South African Med. J.* 1958, Aug. 9, v. 32, No. 32, 800–809, 6 figs.

Malaria control operations in the Northern Transvaal were started in 1930. Naturally, progress has been more rapid since the war. It is considered that over 80% of the population at risk 10 years ago are now protected; malaria has been eradicated in many parts and is hypoendemic elsewhere. In planning future control methods, one of the most

important factors to be considered is that the boundaries are common with 4 other malarious territories. 92 cases of malaria (45 Europeans and 47 Africans) were notified in 1957. A map indicates that most of these occurred near the northern and eastern borders. Analysis of blood examinations in the eastern areas by age and sex showed the maximum positive percentages at school age, 5 to 14 years: 5–9 years, M. 8·9%, F. 6·8%; 10–14 years, M. 8·9%, F. 5·5%. There has been no observation showing that the local *P. falciparum* strain has developed any resistance to the drugs used in treatment or prophylaxis.

For the purpose of malaria control the Northern Transvaal is divided into 39 areas of about 1,000 square miles, each with 15–25 labourers under European field assistants. *Anopheles funestus* has been eradicated and *A. gambiae* is the only vector of importance. Check-spraying of some 300,000 huts yearly since 1951 has revealed vector/hut ratios varying from 1:25 to 1:208. Residual spraying with DDT and BHC has been carried out since 1947, and is still carried out once or twice yearly. So far no firm evidence of insecticide resistance has been found: systematic testing by the Busvine test has been started. In the Transvaal *A. gambiae* is exophilic and zoophilic. Serological identifications of blood meals from 283 specimens, performed at the Lister Institute, Elstree, gave the following results: man 4, ox 194, horse 3, pig 2, bovid 47, mammal 22, negative 11. Owing to the exophilic habit of the vector, intensive larviciding has been resorted to in areas which serve as winter breeding places, the Limpopo and its tributaries, Crocodile and Olifants rivers. After years of observation of the winter breeding places, larviciding is carried out (by hand, to attain the greatest thoroughness) while the rivers are at their lowest annual levels. It is believed that *A. gambiae* is imported frequently from neighbouring territories by motor traffic.

A trial of mass chemoprophylaxis was made in one small area where malaria is comparatively common. A single dose of chloroquine diphosphate was given, 600 mgm. base for adults, 300 mgm. for ages 3–12, 150 mgm. for ages under 3. Six weeks later the parasite rate was 5·3% compared with 29·6% before administration of the drug. A similar trial with Daraprim [dose not stated] showed a reduction of parasite rate from 24·1% to 2·4%. The total *per caput* cost of antimalarial measures in 1955–56 was 2 shillings. *B. B. Waddy*

Reid, J. A. & Ahmad, M. D. B. **Malaria Control in the Federation of Malaya.** *Med. J. Malaya.* 1958, June, v. 12, No. 4, 569–84, 1 diagram. [42 refs.]

The paper starts with a review of the history of malaria control in Malaya, from Watson's work at Klang in 1901 to the present. Out of the 1957 population of 6¼ million, 90% of 2·32 million urban dwellers, and 23% of 3·93 million rural dwellers were protected by some form of

malaria control. In urban control antilarval measures still predominate. In rural control residual insecticides and, on estates, prophylactic drugs are used. The annual cost (urban and rural combined) is $2.10 per person protected. Since the war there has been a dramatic fall in malaria incidence on estates and throughout the country. Government hospital admissions due to malaria, which averaged 17 per mille per annum before the war, fell to 1·2 per mille per annum in 1956. However, incidence among the 3 million persons living in unprotected kampongs is thought to be as high as ever.

It is acknowledged that the ultimate aim should be malaria eradication, but there are technical and administrative difficulties. Residual insecticides alone will not terminate transmission. *Anopheles letifer*, *A. barbirostris* and *A. sundaicus* are much less susceptible to insecticides than *A. maculatus*. and all these mosquitoes being exophilic tend not to rest on sprayed surfaces. A combined programme of insecticide and drug prophylaxis will be needed. Spraying costs about $1.50 per person per annum, and the combined programme cost is estimated at $2.00 per person per annum. To extend protection to the 3·24 million at present unprotected would raise the annual cost to Government of malaria control from $4 million to $10·5 million, a sum which the country is unlikely to afford as indefinitely continued recurrent expenditure. To institute country-wide control and later to abandon it would be far worse than never to have started it, as the population would be left, with immunity lost, exposed to epidemic malaria. There must therefore be proof that eradication of malaria is a possibility in Malaya, before country-wide control is commenced. A plan has been prepared, though not yet approved, for a 5-year eradication trial costing $2·90 million to be followed if successful by country-wide control for 5 years. A malaria training centre, included in the cost of the trial, would be a permanent asset.

[The abstract gives only the outline of an interesting paper.]

B. B. Waddy

Venkat Rao, V. **On the Importance of Limnological Studies in Some Malaria Eradication Schemes.** *Indian J. Malariology.* 1957, Dec., v. 11, No. 4, 339–54. [42 refs.]

Bouisset, L. & Ruffié, J. Sur l'évolution du paludisme à *Plasmodium berghei* (Vincke et Lips) chez le Rat blanc (*Rattus norvegicus* L.) carencé en vitamine A. [**The Development of *P. berghei* in White Rats deprived of Vitamin A**] *C.R. Soc. Biol.* 1958, v. 152, No. 1, 168–71, 1 chart. [10 refs.]

It has been shown by many authors that the composition of the diet can markedly affect the degree of a parasitic infection. The present authors have investigated the effect of absence of vitamin A in the rat

infected with *Plasmodium berghei*. The rat was chosen as experimental animal because of its relative resistance to this infection when receiving normal diet, and dietary vitamin A can readily be adjusted. Only 4 rats were used in these preliminary experiments; 2 were given normal diet and 2 a diet deficient in vitamin A. The composition of these diets is given in detail. After some weeks the diet deficient in vitamin A produced characteristic symptoms in the rats, including loss in weight. The animals were then infected intraperitoneally with parasitized blood, and the course of infection was then followed in stained smears. In vitamin-deficient animals parasite numbers increased with regularity till death intervened after 16 to 23 days' infection. In the control animals the rise in infection was slow and parasitaemia soon declined, the animals becoming free from parasites after 23 days.

[The work of Fabiani and Grellet (this *Bulletin*, 1953, v. 50, 12) on the relation between vitamin A and the intensity of *P. berghei* infection in white rats is not mentioned. The results differ from those of the present authors.] *J. D. Fulton*

Adler, S. **The Effect of a Meat Diet on the Course of Infections with *Plasmodium vinckei* in Mice.** *Bull. Res. Counc. of Israel.* 1958, June, v. 7E, Nos. 1/2, 9–14.

A strain of *Plasmodium vinckei* was employed which produced 100% mortality in mice after intraperitoneal infection. If the mice were placed on a meat diet, the parasites did not develop, even if the mice had been splenectomized. When *p*-aminobenzoic acid, 2 μgm. per day, was injected into the mice, the infection developed normally, showing that the plasmodia required *p*-aminobenzoic acid which was lacking in mice on a meat diet [*cf.* Maegraith *et al.*, this *Bulletin*, 1953, v. 50, 384; and Hawking, *ibid.*, 1954, v. 51, 538]. In splenectomized mice, daily doses of 0·5–1·0 μgm. were sufficient.

The mice which were kept on a meat diet ultimately developed a severe anaemia, which could be prevented by adding 25% of liver to the meat diet and could be rapidly cured by giving a liver diet, but not by giving B12 or folic acid. The anaemia was mainly macrocytic and hyperchromic, and there was marked anisocytosis. In mice receiving liver, *P. vinckei* produces a fatal infection, as it does in mice on the normal standard diet. *F. Hawking*

Rama Rao, R. & Sirsi, M. **Biochemical Studies in Avian Malaria (*P. gallinaceum*). Effect of *P. gallinaceum* Infection on Amino Acids of the Chick.** *J. Indian Inst. Sci.* 1958, Apr., v. 40, No. 2, 23–30 (Sect. A.), 1 fig. on pl. [13 refs.]

The authors investigated the effect of *Plasmodium gallinaceum* infection on changes in free and bound amino acids in whole blood, plasma,

red cells, liver and brain of chickens 4 to 6 weeks old. Estimations of amino acids were carried out on controls and subsequently on infected animals during the incubation period and at the height of infection. Protein was precipitated with alcohol in tissue homogenates and was then hydrolysed with 5N HCl. Free amino acids were extracted by addition of chloroform to the alcohol. In both cases the free amino acids were estimated by a paper chromatographic method, ninhydrin spray being used to indicate their position prior to extraction.

It was found that in the hydrolysate of whole blood the content of certain amino acids varied widely during the incubation and acute stage of the infection respectively. The amount of these substances in red blood cells and plasma varied in different ways. In liver and brain there was a general decrease in amino acids from the start of infection. The marked increase in certain amino acids in red blood cells throughout infection was thought to be of significance for nutrition of the parasites.

J. D. Fulton

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Commission for Technical Co-Operation in Africa South of the Sahara. International Scientific Committee for Trypanosomiasis Research. Sixth Meeting. Salisbury, 1956, pp. xii + 216, illustrated. [Numerous refs.] 1958. London: 43, Parliament Street, S.W. 1. Bakavu: B.P. 949, Belgian Congo.

This Commission, founded in 1950, held its sixth meeting in Salisbury, S. Rhodesia, in 1956. The meeting was attended by medical and other professional representatives from nearly every territory in Africa where the problem of trypanosomiasis arises; additional communications from other workers in this field also were submitted to the conference. The printed report of the meeting therefore covers a very wide range of activities in matters relating to trypanosomiasis chiefly of man but also of stock. It is published as a collection of 31 fairly brief scientific papers by the various contributors.

It is impracticable to summarize effectively these contributions, but the publication as a whole is a valuable one and it should be consulted in the original by those concerned with the problems of prevention and

control, of diagnosis and of treatment, and of eradication more particularly of human African sleeping sickness. *A. R. D. Adams*

Maillot, L. Élevage de *Glossina fuscipes quanzensis* Pires à Brazzaville. [**Rearing of** *Glossina fuscipes quanzensis* **at Brazzaville, French Equatorial Africa**] *Bull. Inst. d'Études Centrafricaines.* (n.s.) 1958, Nos. 15/16, 85–90, 2 figs.

Between 1948 and 1955 about 15,000 females of *Glossina fuscipes quanzensis* were captured in the Congo river area and kept in the laboratory on fowl or guineapig blood meals until they had deposited a puparium. Of 1,159 puparia obtained, flies emerged from 56%; the sex ratio was nearly 1:1. Flies emerged in all months of the year but the greatest percentages of emergence were from July to September. This coincided with the season of lowest humidity (72% RH in August) at Brazzaville, laboratory conditions approximating [apparently] to outdoor conditions. Charts show that temperature is also then lowest (about 21°C. in July) for the year and the duration of the pupal period was longest in this period (31 to 39 days for males, 29 to 37 days for females). In months when temperatures were higher (about 26°C.), the pupal period was from 25 to 30 days. Male puparia lasted about 2 days longer than those of females. *D. S. Bertram*

Janssens, P. G., Charles, P., Van Sande, M., Karcher, D. & Lowenthal, A. Sur la composition du liquide céphalo-rachidien de sujets atteints de trypanosomiase africaine. [**The Composition of the Cerebrospinal Fluid in Subjects suffering from African Trypanosomiasis**] *C.R. Soc. Biol.* 1958, v. 152, No. 2, 359–62.

In the cerebrospinal fluid of 7 patients suffering from subacute and chronic sleeping sickness a fall was observed in the proportion of the albumin and a rise in that of the gamma globulin. Whereas normally the gamma globulin amounts to 7·8 ± 16%, levels varying from 25·3 to 47·8% were observed in these patients. There was no rise in the proportions of the alpha globulins, but that of the beta globulin was slightly raised. In 5 patients the distribution of the protein-bound carbohydrate was examined. There was also a fall in the albumin and in the alpha globulin fractions, and in 4 of the sera the carbohydrates associated with $alpha_1$ globulin were considerably lowered. In 7 patients the total amount of protein-bound carbohydrate was determined and found to be raised in 5. The last finding clearly differentiates the cerebrospinal fluid of sleeping sickness from that of disseminated sclerosis.

H. Lehmann

Lapierre, J., Larivière, M. & Rousset, J. J. Protection de la souris contre une souche virulente de *Trypanosoma gambiense* par certaines espèces de *Borrelia*. [**Protection of the Mouse against a Virulent Strain of *Trypanosoma gambiense* by Certain Species of Spirochaetes**] *Bull. Soc. Path. Exot.* 1958, Mar.–Apr., v. 51, No. 2, 173–6.

The authors used a West African strain of *Trypanosoma gambiense* which regularly killed mice in 3 to 5 days. Two lots of 8 mice each were infected respectively with *Spirochaeta duttoni* and *S. hispanica* and on the third day of the infection inoculated with the strain of *T. gambiense*. Trypanosomes appeared in the blood within 24 hours in the same numbers as in control mice, but in the case of the animals infected with *S. duttoni* the numbers of trypanosomes diminished during the following days and except for one animal, which died on the sixth day, the mice survived for 14 to 65 days. The infections showed either a series of relapses or a single terminal attack, and the trypanosomes retained their full virulence for other mice. On the other hand, *S. hispanica* was found to have no protective effect. These results agree with similar experiments on the effect of the same spirochaetes on *Trypanosoma brucei*.

[See this *Bulletin*, 1958, v. 55, 768.] *Edward Hindle*

Ainley, A. D. & Davey, D. G. **The Trypanocidal Activity of some Pyrimidylaminophenylarsonic Compounds.** *Brit. J. Pharmacol. & Chemotherapy.* 1958, Sept., v. 13, No. 3, 244–9.

"A series of substituted pyrimidylaminophenylarsonic acids have been prepared, reduced to the corresponding oxophenylarsines and finally, in certain cases, to the arsenobenzenes. The tervalent arsenicals were highly active against *Trypanosoma rhodesiense* in mice. 4-(2:6-Diaminopyrimid-4-ylamino) phenyloxoarsine either as the insoluble carbonate or the soluble isethionate was the most promising of these compounds."

De Bustamante, F. M. Distribuição geográfica dos transmissores da Doença de Chagas no Brasil e sua relação com certos fatôres climáticos. Epidemiologia e profilaxia da enfermidade. [**Geographical Distribution of the Vectors of Chagas's Disease in Brazil and Its Relationship to Certain Climatic Factors. Observations on Epidemiology and Control**] *Rev. Brasileiro Malariologia.* Rio de Janeiro. 1957, Apr., v. 9, No. 2, 191–211, 1 map. [11 refs.] English summary.

In 1950, the National Malaria Service, as it then was, initiated studies to determine the distribution of triatomid vectors of Chagas's disease in Brazil. Earlier publications resulting from this policy and unpublished data are incorporated in this paper which summarizes in the text,

tabularly and with a map, the distribution, in many towns of the several states, of the vectors *Triatoma infestans*, *Panstrongylus megistus*, *T. sordida*, *T. brasiliensis* and *T. maculata*. These species, habitually occurring in human dwellings, are considered to be the epidemiologically important vectors. The highest infection rate for *Trypanosoma cruzi* (27·69%) is given for *T. infestans* with progressively lower percentage infection rates in the above order of species down to 3·27% for *T. maculata*. Note is made that the incidence of cardiac forms of Chagas's disease is not in Brazil uniformly associated with high incidence of disease in man or high infection rates in bugs. Further investigation of this is envisaged. Control with residual insecticides is considered, 500 mgm. gamma BHC per square metre annually being recommended as adequate to control the semi-domestic species of triatomid with prospects of eradication at least in isolated foci of the domestic *T. infestans*.

D. S. Bertram

De Carvalho, A. G. & Verano, O. T. Epidemiologia e profilaxia da doença de Chagas em Goiás. [**Chagas's Disease in the State of Goiás, Brazil. Epidemiology and Control**] *Rev. Goiana Med.* 1956, Oct.–Nov.–Dec., v. 2, No. 4, 241–77, 3 figs. [14 refs.] English summary.

A survey of triatomid bugs, and of their infection rate with *Trypanosome cruzi*, in houses in the State of Goiás, Brazil, revealed bugs in all parts of the State except in the north. *Panstrongylus megistus* and *Triatoma sordida* were recorded from nearly 50 of the 59 counties surveyed with infection rates of, respectively, about 18% and 1% for *T. cruzi*. *T. infestans*, although found in only 25 counties, was in greater numbers and the infection rate for *T. cruzi* was nearly 23%. Substantial numbers of all three species of bug were examined. *Rhodnius prolixus* (much less prevalent and numerous) was not found positive for the trypanosome. *T. infestans* is considered the important vector of Chagas's disease, with *P. megistus* and *T. sordida* secondary in importance and *R. prolixus* of no significance. Residual spraying of houses with gamma BHC at 500 mgm. per square metre, begun in 1951, has been progressively extended. Reduction of bugs by 85% is reported and also of cases of the disease.

D. S. Bertram

De Lucena, D. T. Persistência do *Trypanosoma cruzi* vivo em triatomíneos mortos. [**Persistence of Living** *Trypanosoma cruzi* **in Dead Triatomids**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1957, Apr., v. 9, No. 2, 177–9.

The English summary appended to the paper is as follows:—

"Infected triatomides with *Trypanosoma cruzi* dead by cutting the head persisted with living crithidias and trypanosomoses in the rectal

contents for nine days. This record is emphasized as safe for purpose of routine examination of dead bugs coming from abroad in epidemiological surveys on Chagas' disease, in this part of the country.

" Re-examination of the same specimen is not profitable because of dryness of intestinal contents after the first opening of the tip of the bug abdomen.

" An attempt to determine the longest record for detection of living *T. cruzi* after death of bugs was not made."

Brant, T. C., Laranja, F. S., De Bustamante, F. M. & Melo, A. L. Dados sorológicos e eletrocardiográficos obtidos em populações não selecionadas de zonas endêmicas de Doença de Chagas no Estado do Rio Grande do Sul. [**Serological and Electrocardiographic Findings in Unselected Populations in Endemic Zones of Chagas's Disease in the State of Rio Grande do Sul, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Apr., v. 9, No. 2, 141–8, 1 fig. & 2 graphs. [12 refs.]

The English summary appended to the paper is as follows:—

" A serological and electrocardiographical survey was effected among non selected populations in Chagas' disease endemic areas, in 4 counties of the State of Rio Grande do Sul.

" The Guerreiro-Machado's reaction showed 23·88% of positive cases among 5,460 individuals.

" Electrocardiograms were secured for 2,172 individuals, which showed myocardic abnormalities of 6·5% of the total group.

" Of the 143 abnormal electrocardiograms, 102 belonged to the group of 1,465 persons with a negative Guerreiro-Machado's reaction (6·5%) and the remaining 41, to the group of 707 individuals with positive results of this reaction (5·7%).

" Nevertheless there was not a very great difference in the incidence of electrocardiographical alterations of the two groups of individuals, separated according to the results of the complement fixation test.

" The results of this survey tend to show that Chagas' disease, among the populations studied in the State of Rio Grande do Sul, is not of extreme importance as the cause of chronic myocardic alterations."

Rêgo, S. F. M., Magalhães, A. E. A. & Siqueira, A. F. Um novo tripanossomo do gambá *Trypanosoma freitasi*, n. sp. [**A New Trypanosome, *Trypanosoma freitasi* from the Opossum**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Apr., v. 9, No. 2, 277–84, 4 figs.

The English summary appended to the paper is as follows:—

" *Trypanosoma freitasi*, n. sp. found in the blood of the opossum, *Didelphys paraguayensis paraguayensis* is described. It differs both

morphologically and biologically from other mammalian tripanosomes, specially from *T. cruzi*-like species and *T. fluminense* Silva, 1953 which occur in naturally infected opossums, as well as from *T. rangeli* which has been inoculated into these animals.

"*T. freitasi* was precariously cultivated in N. N. medium. Attempts to infect mice and opossums under laboratory conditions, as well as triatomid bugs, *Rhodnius prolixus*, *Triatoma sordida* and *Triatoma infestans* have been consistently unsuccessful. No pathological changes which could be attributed to the parasite were observed in sections of muscles, heart, lung, kidney, liver, salivary glands, spleen, bladder, testicle, intestine, adrenals, and lymph glands."

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Deane, L. M. & Deane, Maria P. Observações sôbre abrigos e criadouros de flebótomos no noroeste do Estado do Ceará. [**Observations on Resting- and Breeding-Places of** *Phlebotomus* **in the North East of the State of Ceará, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Apr., v. 9, No. 2, 225–46, 9 figs. [18 refs.] English summary.

From January to August 1954, and in January and February of 1955 and 1957 a total of 63,000 adult sandflies (*Phlebotomus*) were collected at rest in houses, animal sheds, and outdoor resting places in the state of Ceará, Brazil. Numerous cases of visceral leishmaniasis occurred in the areas studied. Immature stages were very difficult to find, only 12 of 241 potential breeding places examined yielding larvae or pupae, or adults subsequently emerging from materials kept under observation in the laboratory. The majority of the adults have been identified: about 60,000 were *P. longipalpis*, 2,000 *P. oswaldoi*, and there were 350 specimens, or usually fewer, of 12 other species.

P. longipalpis, the vector of leishmaniasis, was taken in large numbers in houses, and in animal shelters (horse, mule, cattle, goat, pig and fowl), and not uncommonly in outdoor resting places (tree-holes, foliage, leaf-mould, crevices of rocks, between and under stones, caves). 4,000 adults were once caught on a mule used as bait. Breeding was located in the soil in a mule shelter, under rocks (shaded or unshaded by vegetation) and in the earth in a deep rock crevice. *P. oswaldoi* occurred in houses, commonly in abandoned houses, apparently feeding on lizards, and also in domestic animal shelters and in a range of outdoor resting places similar to those for *P. longipalpis*; it occurred more often outdoors

than indoors. It was not taken on human bait and only once on mule bait. It was found breeding under rocks in shade, in a rock fissure, soil from caves, and scrapings from a tree trunk. *P. rickardi* adults (350 specimens) resembled *P. oswaldoi* in habit, with tree-holes a preferred outdoor resting place. Adults of *P. migonei* and *P. whitmani* (only 115 and 227 specimens, respectively) were found in the cooler forested mountains in houses, animal sheds and outdoor sites. All of 180 adults of *P. lenti* were captured in houses, but the number of specimens of this and other species was too small for assessment of their usual habits. A single *P. cortelezzii* was bred from scrapings from a tree.

As regards the breeding of *P. longipalpis* it is concluded that either the typical breeding place is yet to be discovered or breeding is so widely dispersed that finding immature stages must always remain difficult. The extensive areas of rock and stone favour the latter view. Resting places and breeding sites are illustrated with photographs. *D. S. Bertram*

Rodrigues da Silva, J. & de Paola, D. O problema das fibroses hepáticas na leishmaniose visceral americana. [**Liver Fibrosis in American Visceral Leishmaniasis**] *Gaz. Méd. Portuguesa.* 1958, May–June, v. 11, No. 3, 361–78, 13 figs. [32 refs.]

The English summary appended to the paper is as follows:—

"The authors describe the different types of fibrotic liver changes observed in cases of American Kala-azar as well as try to establish the connections between those lesions and some other etiologic factors, also coexistent with Kala-azar in Brazil, such as Schistosomiasis and nutritional deficiencies.

"The significance of the changes found is discussed in detail and emphasis is given to a peculiar type of liver fibrosis, found in one of the cases presented, which is supposed to be characteristic of the action of Leishmania donovani."

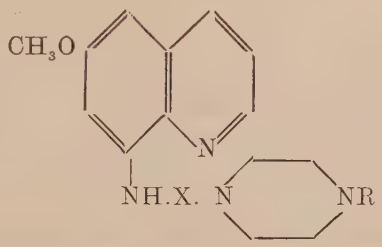
Chatterji, A. & Sen Gupta, P. C. **Urinary Excretion of 17-Ketosteroids in Kala-Azar.** *J. Indian Med. Ass.* 1958, July 1, v. 31, No. 1, 11–13.

In 16 patients with kala azar, varying in age from 10 to 57 years, urinary excretion of 17-ketosteroids was determined on admission to hospital, and in 11 of them after recovery. The 24-hour output was below 6·3 mgm. in all, and in 7 was below 3 mgm. After recovery the values had risen to above 9 mgm. in 4 of 11 and in the others were also above the initial figure. The authors rightly state that a low 17-ketosteroid excretion is associated with malnutrition and debility and that it can therefore not be assumed that the low figures obtained in this series are specifically related to kala azar. *H. Lehmann*

See also p. 29, Herrer, Verruga y uta en el valle de Huaillacayán (Dpto. de Ancash). I. Determinación de los límites altitudinales de la zona endémica y de la incidencia de amebas enfermedades. [**Verruga and Cutaneous Leishmaniasis in the Huaillacayán Valley, Peru. I. Determination of the Limit of Altitude of the Endemic Zones and of Incidence of these Diseases**]

Beveridge, E., Goodwin, L. G. & Walls, L. P. **A New Series of Leishmanicides.** [Correspondence.] *Nature.* 1958, Aug. 2, v. 182, 316–17.

The authors describe a group of compounds of the 8-aminoquinoline series of the general formula



which possess activity against *Leishmania*. In the formula X represents a straight or branched alkylene chain. The piperazine ring is essential for activity and cannot be replaced by other basic ring structures. The 5:6 dimethoxy compound is also active, and if the methoxy group in position 6 is replaced by an ethoxy or hydroxy group activity is retained, but not if replaced by Cl or H. Where X = $(CH_2)_3$ there is marked activity and also when R in the piperazine ring represents H, alkyl or hydroxyalkyl. Substitution by COOEt, $CONEt_2$ or aryl usually caused loss of activity. Activity was shown by some members of the series against *Plasmodium gallinaceum* infections in chicks. The new substances appear to be more active than pentavalent antimonials or diamidines and act when given orally. *J. D. Fulton*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Lawy, H. S., Beattie, C. P. & Bensted, H. J. **Brill-Zinsser Disease; the Possibility of its Occurrence in Britain.** *J. Hygiène.* 1958, Sept., v. 56, No. 3, 355–63. [19 refs.]

Complement-fixation tests on sera from Polish refugees in Great Britain revealed that 70 out of 318 contained specific typhus antibodies.

Titres of 1 in 5 or higher against epidemic typhus antigen were found in the sera of 46% of persons (43 out of 94) with a history of typhus fever and in the sera of 12% (27 out of 224) without such a history. Negative results (titres less than 1 in 5) were obtained with 174 sera from British-born subjects.

It is concluded that, although Brill-Zinsser disease is unlikely to be a serious problem in Great Britain, an occasional case may be seen. "Any patient of Eastern European origin or who has a history of typhus complaining of fever and severe headache should be examined serologically by the rickettsial agglutination or the complement-fixation test for specific epidemic typhus antibodies. The Weil-Felix reaction may be positive, but a negative result will not exclude a diagnosis of Brill-Zinsser disease." *R. S. F. Hennessey*

Sciarz, W. Dur wysypkowy na ziemiach polskich w roku 1812–1813 i ówczesne poglady na zapobieganie szerzeniu sie tej choroby. (Notatka historyczna.) [**A Historical Note on Epidemic Typhus in Poland in 1812–1813 and on Preventive Measures recommended at that Time**] *Przegląd Epidemiol.* Warsaw. 1958, v. 12, No. 2, 201–5.

Bilek, M., Lutyński, R. & Raginis, Z. Próba odtworzenia przebiegu zachorowań w dawnym ognisku epidemicznym duru wysypkowego. [**An Attempt to reconstruct the Course of an Epidemic of Typhus Fever after a 10-Year Period**] *Przegląd Epidemiol.* Warsaw. 1958, v. 12, No. 2, 165–70. [11 refs.]

The English summary appended to the paper is as follows:—

"An attempt to depict the course of a typhus epidemic was made on the basis of questionnaires and serological investigations (CFT). The epidemic in question was noted during the winter-period of 1944/45 in a mountain-village. As a result of the above mentioned investigation it was established that about 40% of the village population was ill in 1944/45 with typhus fever. After a period of about 10 years—60·5% of them showed a positive CFT with Rickettsia antigen at 1:10–1:40 and in younger persons—even a higher antibody level was found. Some people being in 1944/45 in their teens or younger were infected but probably showed no clinical symptoms."

Cole, M. M. & Clark, P. H. **Tests with Compounds showing Synergistic Action with Rotenone against Body Lice.** *J. Econom. Entom.* 1958, Aug., v. 51, No. 4, 484–6. [10 refs.]

"Sulfoxide and piperonyl butoxide were highly synergistic with rotenone in laboratory tests against body lice, *Pediculus humanus*

humanus L.; (Anoplura: Pediculidae), and 1,2-methylenedioxy-4-[2-(octylsulfonyl)propyllbenzene, 5-butyl-5-ethyl-2-(3,4-methylenedioxy)-*m*-dioxane, and the *alpha*-allylpiperonyl ester of fencholic acid showed a lower degree of synergism. Rotenone alone was less toxic to lice than the other compounds. A powder containing 0·5% of rotenone and 5% of sulfoxide was highly effective for a longer period than one containing 0·2% of pyrethrins and 2% of sulfoxide in tests against DDT-resistant lice on human subjects."

Balaeva, N. M. **Study of the Properties of *Rickettsia mooseri* cultivated in Clothes Lice (Preliminary Communication).** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 5/6, 823–9, 1 fig. [20 refs.] [Translated from Russian.]

Rickettsia mooseri was maintained in body lice through 40 passages extending over 10 months. Massive infection of gut epithelium with the death of the lice as early as the seventh day occurred. Neither in this effect, nor in pathogenic effects in guineapigs, rats and mice, nor in serological findings was there evidence of changes in the biological properties of the organism during its prolonged passage in lice. It is concluded that the results do not support the view by other workers that *R. mooseri* once in lice may rapidly change into *R. prowazeki*.

D. S. Bertram

Oleś, A. Der erste Q-Fieberfokus in Polen. [**The First Focus of Q Fever in Poland**] *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1958, v. 2, No. 2, 143–7.

"The paper describes the first epidemic of Q fever to be reported in Poland. The outbreak, which involved 35 persons, was caused by a flock of imported sheep. Serological examination by a complement-fixation test revealed that 31% of the animals were infected.

"Since this was the first epidemic of this type in Poland, the whole flock was destroyed.

"The author goes on to describe the hygienic and prophylactic measures taken during slaughter and discusses the question of this first manifestation of Q fever in Poland and the effectiveness of the method employed for dealing with it."

Paretsky, D., Downs, C. M., Consigli, R. A. & Joyce, B. K. **Studies on the Physiology of Rickettsiae. I. Some Enzyme Systems of *Coxiella burnetii*.** *J. Infect. Dis.* 1958, July–Aug., v. 103, No. 1, 6–11, 2 figs. [19 refs.]

"Some metabolic activities of purified, nonproliferating suspensions of *C. burnetii* and of cell-free preparations of *C. burnetii* have been studied. *C. burnetii* possesses an ATPase and an ADPase. The rickettsiae can

synthesize citrate from acetate or acetyl phosphate in the presence of oxalacetate but not with malate. Cell-free rickettsial preparations also possess dehydrogenase activity as evinced by the reduction of DPN+ in the presence of malate and glutamate, but not citrate."

Oleś, A., Kurzeja, K. & Berłowski, J. Przegląd kliniczny i serologiczny ozdrowieńców po gorączce Q. [**A Clinical and Serological Survey of Q Fever Convalescents**] *Przegląd Epidemiol.* Warsaw. 1958, v. 12, No. 2, 171–6.

The English summary appended to the paper is as follows:—

"Clinical and serological investigations were carried out in 1957 in 12 persons, who suffered from Q-fever 10–12 months ago—during the first outbreak of this disease reported in Poland. It was established that even a severe course of the illness did not affect seriously the health of the patients. Pleural adhesions possibly due to the illness were found in 2 cases only. A convalescent period accompanied by certain physical disability lasted 1–3 months. The CFT carried out a year after with the Henzerling-antigen of R. burneti showed a titer of 1:5–1:40 in 8 persons. In 4 persons the test was negative."

Tarasevich, I. V. **A Study of Experimental Q Fever Infection in *Hyalomma plumbeum plumbeum* Panz.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 5/6, 818–23, 3 figs. [10 refs.] [Translated from Russian.]

Only a few rickettsiae of *R. burneti* were found in smears of *Hyalomma plumbeum plumbeum* after infection by feeding on guineapigs febrile with Q fever. But, after inoculation of the organisms into the haemocoele of the tick, considerable numbers were to be found in haemocytes, plasma, intestinal epithelium and lumen, salivary glands and ovaries within 3 days and until the 25th day when observations concluded. Visual evidence was confirmed on some occasions by infection of guineapig and chicken embryo by inoculation with suspensions of these organs. The organism was observed before the third day as bacillary forms in the plasma, haemocytes and gut, but from the third day onward a fine coccoid form was more usual in the tissues. This is accepted as evidence of tick tissues being a favourable medium for rickettsial development and multiplication. The ticks (nymphs and females) survived their infection; viable eggs were laid.

H. p. plumbeum was used as it was known to the authors as a successful vector of the rickettsia, in which the organism passed from stage to stage of the tick, including transovarially. It is not definitely stated, but it appears that insufficient organisms were ingested by ticks feeding on febrile guineapigs to enable the natural course of the rickettsial development in the tick to be followed.

There are photographs of rickettsiae in smears of haemolymph and salivary glands. *D. S. Bertram*

Rehn, F. Experimentální infekce lišky (*Vulpes vulpes*) a myši lesní (*Apodemus flavicolis*) původcem Q horečky. [**Experimental Infection of the Fox** (*Vulpes vulpes*) **and the Forest Mouse** (*Apodemus flavicolis*) **with the Causative Agent of Q Fever**] *Československ. Epidemiol., Mikrobiol., Imunol.* Prague. 1958, v. 7, No. 5, 317–20. [21 refs.]

The English summary appended to the paper is as follows:—

"The author carried out an experimental infection of foxes (vulpes) and forest mice (Apodemus flavicolis) with the causative agent of Q-fever. He employed the Henzerling strain for the experiment. He infected two of three foxes subcutaneously with 1 ccm of yolk sac suspension, diluted to 10^{-3}, and the third one with a dilution of 10^{-5} of the same substance. For 30 days temperature, viremia, rise of CF antibody levels and the excretion of coxiellas in the feces were observed. After the 30 days attempts were made to demonstrate coxiellas in the spleen, the liver, the kidneys, the testes and the lymphatic ganglia of the infected animals in a test on guineapigs. In all the isolation trials a blind passage was performed.

"The experiments showed no rise of temperature in the foxes and the virus was not demonstrated either in the blood and feces, or in the organs. Levels of CF antibodies rose in the foxes from zero to a significant height within 15 days after the injection.

"In Apodemus flavicolis only viremia was being observed. Five specimens were infected subcutaneously with 0·2 ccm of yolk sac diluted to 10^{-4}. The mice were exsanguinated one by one on the first, third, fifth, eighth and twelfth day after having been infected. The blood was injected into guineapigs. Viremia was demonstrated from 24 hours after the injection to the 12th day, *i.e.* on the last day of observation."

BARTONELLOSIS

Herrer, A. Verruga y uta en el valle de Huaillacayán (Dpto. de Ancash). I. Determinación de los límites altitudinales de la zona endémica y de la incidencia de ambas enfermedades. [**Verruga and Cutaneous Leishmaniasis in the Huaillacayán Valley, Peru. I. Determination of the Limit of Altitude of the Endemic Zones and of Incidence of these Diseases**] *Rev. Med. Exper.* Lima. 1957, Dec., v. 11, Nos. 1/2, 40–49, 1 chart & 1 folding map.

The English summary appended to the paper is as follows:—

"The results of epidemiological observations made on Carrion's disease

(verruga peruana) and cutaneous leishmaniasis (uta) in Huaillacayán valley (10°18′ latitude South) are presented. The purpose of the study was to determine the altitude limits of the endemic zones, and the incidence of both diseases in relation to these altitudes. The principal conclusions obtained were the following:

"1. The endemic zone of *uta* ranged from 900 to 3,000 meters of altitude above sea level. The upper limit of the endemic zone of Carrion's disease was also about 3,000 meters, but in this case the lower limit could not be determined, due to application of DDT insecticide during previous years between sea level and 780 meters. Nevertheless, the author suggests, through personal observations and technical judgement, that in the Huaillacayán valley the verruga zone probably descends more than the uta zone.

"2. The incidence both of uta and verruga seems to be determined by the altitude of the localities above sea level. The highest incidence of verruga was found from 900 to 1,800 meters, while that of uta ranged from 1,800 to 2,700 meters.

"3. In Huaillacayán valley the endemic zone, both of verruga and uta, descended more than in the Rimac valley, which is situated at one and a half grade south of Huaillacayán."

NAUCK, E. G. Morphologische und biologische Eigenschaften der Bartonellen. [**Morphology and Biological Characters of Bartonella**] Reprinted from *Forsch. u. Fortsch.* 1958, May, v. 32, No. 5, 129–31, 2 figs.

Since the identity of the diseases Verruga peruviana and Oroya fever was conclusively established by the personal experiment of the Peruvian student CARRIÓN which led to his death and on account of which this condition is referred to as Carrión's disease, much work has been done in the Tropical Institute of Hamburg on the appearances of minute bacillary forms associated with the anaemia which may develop in splenectomized rats. The organism concerned has been described as *Haemobartonella muris* and, as time has gone on, similar findings have been made in other mammals so that a group of organisms has come to be known by the name of *Haemobartonella* or *Eperythrozoon*.

On account of similarities of appearance under the light microscope and of the fact that both forms give rise to anaemia, it has been assumed that these organisms are very closely related and they appear in the family Bartonellaceae and the order Rickettsiales in Bergey's Handbook. This, the author claims, is not justified, because observations with the electron-microscope show that *Bartonella bacilliformis* has the character of a bacterium, being provided with a peripheral membrane and unipolar flagella. No such membrane can be observed in *Haemobartonella muris* and similar organisms nor can any flagella be detected. Further points of differentiation are that *Bartonella muris* can be readily digested by

trypsin whereas *B. bacilliformis* is resistant; that infection with *B. bacilliformis* can be transmitted to rhesus monkeys and that this organism can be cultivated whereas the animal *Bartonella* cannot. The latter appear to come somewhere in the group of micro-organisms intermediate between bacteria and viruses. *J. W. McLeod*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Martínez Báez, M. Introducción al symposium sobre fiebre amarilla. [**Introduction to a Symposium on Yellow Fever**] *Gac. Méd. de México.* 1958, Apr., v. 88, No. 4, 221–4.

Bustamante, M. E. Epidemiologia de la fiebre amarilla en América Central. [**Epidemiology of Yellow Fever in Central America**] *Ibid.*, 225–41, 1 fig. & 3 maps. [31 refs.]

Campillo S., C. Los virus de la fiebre amarilla. [**The Virus of Yellow Fever**] *Ibid.*, 243–52, 1 fig. [16 refs.]

Martínez Báez, M. La anatomía patológica humana y animal en la fiebre amarilla. [**Pathological Anatomy of Yellow Fever in Man and Animals**] *Ibid.*, 253–9.

Vargas, L. Profilaxis de la fiebre amarilla. [**Prevention of Yellow Fever**] *Ibid.*, 261–7.

Martínez Báez, M. Conclusiones. [**Conclusions**] *Ibid.*, 269–70.

See also p. 99, Le Gac *et al.*, En Oubangui-Chari, il existe des hépatonéphrites toxi-infectieuses mortelles non amariles. [**A Fatal Infectious Hepatonephritis in Ubangi-Chari, not due to Yellow Fever**]

Boiron, H. & Camain, R. Étude de la sensibilité du Cobaye à l'ultravirus amaril neurotrope inoculé par voie parentérale. [**Study on the Sensitivity of the Guineapig to the Neurotropic Virus of Yellow Fever inoculated Parenterally**] *C.R. Soc. Biol.* 1958, v. 152, No. 1, 69–71.

The authors carried out a series of experiments on 84 guineapigs which were negative to seroprotection tests, *i.e.* they did not possess antibodies to yellow fever.

Of these, 24 were inoculated by the subcutaneous route and 60 by the intraperitoneal, with varying doses (200 LD50 to 300,000 LD50) of yellow fever virus. None of them showed any apparent illness and at regular intervals blood was drawn from the heart to be tested for virus; some were killed and the blood, spleen, liver and brain tested for the presence of virus. After 25 to 36 days a seroprotection test was carried out on the survivors to ascertain if they had formed antibodies as a result of the inoculation. The presence of neurotropic virus was ascertained by inoculation of blood and suspensions of the organs into the brain of white mice and a specific seroneutralization test was performed on the brain of paralysed mice to confirm that the infection was yellow fever virus.

Results showed that it was not possible to recover the virus from the blood or organs of 6 of the animals which received the smallest doses of the virus subcutaneously; seroprotection tests on the remaining animals 30 days after inoculation were negative. It appears therefore that this dose of virus does not persist when administered subcutaneously, it cannot multiply and is incapable of unloosing the mechanism for elaborating antibodies.

A slightly larger dose administered intraperitoneally to 15 animals gave positive results in 4; virus was detected in the blood, spleen and liver after 4 days, in the spleen and liver of 2 after 7 and 8 days, in the brain of 1 after 22 days and the seroprotection test was positive in 1 after 25 days.

Of the 21 animals inoculated with moderate doses either by the subcutaneous or intraperitoneal route 3 animals were carriers of the virus, one 3 days, the second 5 days and the third 7 days after inoculation. Seroprotection tests on 5 animals 25 to 36 days after inoculation were all positive.

Of the 21 animals which received large doses 6 carried the virus after 2 to 7 days; antibodies were present in 2 after 25 and 30 days.

Finally, after very large doses the virus was regularly recovered (3 times out of 3) after 24 hours but seroprotection tests were positive in only 2 out of 3.

The authors conclude that the guineapig is sensitive to parenteral injection of the neurotropic stock of the yellow fever virus. It reacts by an "inapparent" infection but contrary to opinions hitherto held the virus can be recovered from the blood and various organs; it persists for several days in the organism and contributes to formation of antibodies; it appears that the seroprotection test becomes positive only if the virus persists and multiplies in the organism. After inoculation of small doses the virus cannot be isolated and the test remains negative; with moderate doses the virus can be recovered after several days and the test is constantly positive; with very large doses the virus can be demonstrated for only one day and the test is inconstant. *P. A. Clearkin*

DENGUE AND ALLIED FEVERS

ROSEN, L. **Observations on the Epidemiology of Dengue in Panama.** *Amer. J. Hyg.* 1958, July, v. 68, No. 1, 45–58, 1 fig. [28 refs.]

Epidemic dengue was reported in Panama in 1904, 1912, perhaps between 1934 and 1936, and in 1941–2. Sporadic cases were reported in 1946 [this *Bulletin*, 1952, v. 49, 686]. The only known vector, *Aëdes aegypti*, was eradicated at least from the Canal Zone by 1949. Most of the population were vaccinated against yellow fever between 1949 and 1954 [*ibid.*, 1950, v. 47, 1078].

To determine whether such yellow fever antibodies would confuse a serological survey, sera from 79 vaccinated persons who had not left the United States were tested for dengue antibodies: although 63% had yellow fever neutralizing antibodies and 84% yellow fever haemagglutinin-inhibiting antibodies, only 4% had dengue-1 or dengue-2 haemagglutinin-inhibiting antibodies. (2 of these 3 had lived in St. Louis encephalitis endemic areas.)

213 sera from Panama City were tested: 27% had dengue haemagglutinin-inhibiting antibodies but the youngest person with antibody was born in January 1942. When positive sera from persons aged less than 20 years were tested for neutralizing antibodies, 8 of 15 had dengue-2 antibody and none dengue-1 antibody; 12 of them had yellow fever antibody but this was no higher a proportion than among those with no dengue antibody.

These results suggest that the 1941–2 epidemic was due to dengue-2 virus and that the virus has not been active since, perhaps owing to the anti-*aegypti* measures instituted during World War II. 85 sera were collected from an area of the city where anti-*aegypti* control was not undertaken until much later: again no one aged less than 12 had antibody. 160 sera were tested from a small town where *Aëdes aegypti* were numerous until 1949 but the antibody age-pattern was the same as in Panama City. Further studies showed that all the dengue antibody detected in these groups of sera was to dengue-2—in the 8 sera which had dengue-1 antibody there was also dengue-2 antibody.

Enquiries failed to reveal classical clinical cases of dengue occurring in Panama in 1954–5 although pyrexias were common. Paired sera from Americans with pyrexias soon after arrival in Panama were tested but no cases of dengue were detected. In a study of 892 sera from forested areas of Panama, 22 from persons aged less than 12 had dengue haemagglutinin-inhibiting antibody but none of them had neutralizing antibody to either dengue-1 or dengue-2. These antibodies do not appear to be due to yellow fever and another related virus, perhaps Ilheus, is probably responsible. In older age-groups from the forests 20–70% had dengue haemagglutinin-inhibiting antibody, but only 2 sera were found to have only dengue-1 neutralizing antibody. [The author's conclusion that

these suggest that dengue-1 may have been present in Panama seems hardly justified.]

105 monkeys were tested for dengue haemagglutinin-inhibiting antibody: only 2 marmosets had antibody but neither had neutralizing antibody to dengue-1 or dengue-2, and only one had neutralizing antibody to yellow fever. *C. E. Gordon Smith*

ROSEN, L. **Dengue Antibodies in Residents of the Society Islands, French Oceania.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 403–5. [10 refs.]

87 sera collected in the Society Islands in 1951–2 were tested for dengue antibodies; an extensive outbreak of dengue had occurred in the islands in 1944. 25 of 27 sera had dengue-1 neutralizing antibody; 2 of 21 of these positive sera also had dengue-2 neutralizing antibody. 78 of 80 sera from persons aged over 6 years had dengue-1 neutralizing with or without haemagglutinin-inhibiting antibody, while none of 7 sera from children under 7 had antibody. In nearly all the sera the haemagglutinin-inhibiting titre of dengue-1 antibody was 2- to 4-fold higher than the dengue-2 titre. Of 15 sera with dengue-1 haemagglutinin-inhibiting antibody, only 3 had yellow fever haemagglutinin-inhibiting antibody.

The results appear to indicate that dengue disappeared from the islands after the 1944 epidemic although the vector *Aëdes polynesiensis* has continued to be abundant. Presumably nearly all susceptible persons were affected in 1944 and no alternative reservoir to man existed for the virus. The infecting virus appears to have been dengue-1.

C. E. Gordon Smith

ROSEN, L. **Experimental Infection of New World Monkeys with Dengue and Yellow Fever Viruses.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 406–10.

Monkeys of 7 species without dengue antibodies, captured in Panama, were used. Of 30 monkeys inoculated with sera of people experimentally infected with dengue-1 or dengue-2, 24 developed neutralizing antibodies with or without haemagglutinin-inhibiting antibodies: these included individuals of all 7 species. Viraemia capable of killing half of a number of mice inoculated at a dilution of 1 in 10 was demonstrated in 4 species of monkey 4–6 days after inoculation. 2 monkeys had "substantial" neutralizing antibody responses to dengue-1 virus without developing haemagglutinin-inhibiting antibody. Monkeys inoculated with dengue-1 developed much more heterologous dengue antibody than those inoculated with dengue-2. Monkeys inoculated with dengue-2 developed as high haemagglutinin-inhibiting titres against yellow fever as against dengue-1. 5 monkeys of 2 species were inoculated with the Trinidad strain of yellow fever: all 3 marmosets became sick and one died, but neither white-faced

monkey became sick. None of 3 marmosets and 4 black spider monkeys inoculated with 17D yellow fever virus became sick. The yellow fever haemagglutinin-inhibiting antibody response was higher after Trinidad than after 17D virus. Only 1 of 7 monkeys infected with 17D developed dengue haemagglutinin-inhibiting antibody compared with 6 of the 7 inoculated with Trinidad virus: heterologous titres against dengue-2 were usually higher than against dengue-1.

New World monkeys appear from these experiments to be susceptible to infection with dengue viruses. The levels of viraemia detected were low and it is not known whether they would be adequate for mosquito transmission. There is no evidence that monkeys are implicated as a reservoir of dengue in America: none of 105 monkeys tested had naturally occurring antibodies to the dengue viruses.

C. E. Gordon Smith

Pickens, E. G. & Luoto, L. **Tissue Culture Studies with Colorado Tick Fever Virus. I. Isolation and Propagation of Virus in KB Cultures.** *J. Infect. Dis.* 1958, July–Aug., v. 103, No. 1, 102–7, 3 figs.

Isolations of virus were achieved in 3-day cultures of KB cells from all of 12 suspensions of mouse brains infected with Colorado tick fever virus and from 29 of 30 blood samples from 3 infected monkeys. Cytopathic effects appeared in the first passage of the brain materials but a single blind passage was necessary with the bloods. The virus was also isolated from 25 of 118 tick pools and from 42 of 134 blood clots from suspected cases. The cytopathic effects appeared in 2–5 days.

The viruses isolated were confirmed to be Colorado tick fever viruses by neutralization tests and by their effects on suckling mice. Serial passage was successful to a final dilution of the original inoculum of 10^{25}- to 10^{37}-fold after 10–14 passages. After about 6 passages some strains showed diminished mouse pathogenicity but others were unaffected in this way.

A trial is planned to compare the sensitivity of this method with the use of suckling mice which was hitherto the only available technique [this *Bulletin*, 1950, v. 47, 732]. *C. E. Gordon Smith*

Eklund, C. M., Kohls, G. M. & Jellison, W. L. **Isolation of Colorado Tick Fever Virus from Rodents in Colorado.** *Science.* 1958, Aug. 22, v. 128, 413.

Colorado tick fever virus had previously been isolated only from man and the tick *Dermacentor andersoni*. Serological evidence of infection was found in the Columbian ground squirrel (*Citellus columbianus*) in Western Montana and this species was found to be susceptible to experimental infection. After a human outbreak of Colorado tick fever on a

ranch in Colorado a collection of mammals was made in the area. Colorado tick fever virus was isolated from the blood of a total of 4 squirrels (*Citellus lateralis lateralis*) and one porcupine (*Erethizon dorsatum epixanthum*). One of the viraemic squirrels was able to infect *D. andersoni* ticks fed on it. Virus was also isolated from immature ticks collected in the same area, including a group of 4 nymphs from one of the squirrels from which virus was isolated. *C. E. Gordon Smith*

RABIES

Scatozza, F. & Castrucci, G. Il frazionamento dei costituenti cellulari applicato alla ricerca del virus fisso della rabbia. Nota IV.— Ulteriori indagini sul comportamento del virus presente nella frazione nucleare. [**The Fractionation of Cellular Components applied to Research on Fixed Rabies Virus. IV. Further Researches on the Behaviour of Virus present in the Nuclear Fraction**] *Giorn. di Microbiol.* Naples. 1957, Nov.–Dec., v. 4, No. 3, 166–74, 1 fig.

The English summary appended to the paper is as follows:—

"The authors perform further researches on the behaviour of virus present in the nuclear fraction isolated from C.N.S. of rabbits submitted to experimental infection by rabies fixed virus. For this purpose the nuclear fraction, isolated by Schneider's method, is submitted either to repeated washings with physiological saline solution or to lysis with molar NaCl.

"From the results obtained the authors conclude that the repeated washings with physiological saline solution cause, before the appearance of paralytic symptoms, a significant reduction of the infectious titer while, when the disease is manifest, these washings do not influence remarkably the virus content of the fraction. The treatment with molar NaCl causes a constant decrease of virus concentration which, in the material taken from paralysed animals, is bigger than a logarithm compared with the washed nuclear fraction."

Scatozza, F. & Castrucci, G. Il frazionamento dei costituenti cellulari applicato alla ricerca del virus fisso della rabbia. Nota V.— Ulteriori indagini sul comportamento del virus rilevabile a livello dei mitocondri. [**Fractionation of Cellular Constituents as applied to Research on Fixed Rabies Virus; V. Recent Investigations on the Behaviour of Virus recoverable from Mitochondria**] *Giorn. di Microbiol.* Naples. 1957, Nov.–Dec., v. 4, No. 3, 193–200.

The English summary appended to the paper is as follows:—

"In a former paper the authors (1957 b) have shown that rabies fixed

virus can be demonstrated on mitochondria isolated from C.N.S. of rabbits since 4th day after experimental infection. With the aim to bring a further contribution to this subject, they have carried repeated washings on mitochondria isolated from infected rabbits and on normal mitochondria previously contaminated *in vitro* with the same virus. Results of the virus titration after any single washing have shown that whereas infected mitochondria keep up a nearly constant titre the normal ones progressively lose their infectivity. These results give a further confirmation to the hypothesis that, during rabbit's experimental infection, rabies fixed virus is electively laid on mitochondria."

Thiodet, J., Fourrier, A., Massonnat, J. *et al.* Rage declarée traitée par curarisation maxima et ventilation endotrachéale à pression positive. [**Declared Rabies treated by Maximal Curarization and Positive Pressure Endotracheal Ventilation**] *An. Facul. de Med. Montevideo.* 1958, Jan.–Feb.–Mar.–Apr., v. 43, Nos. 1/2, 43–6.

In rabies the patient rarely survives longer than 3–4 days after the onset of the acute phase, death being occasioned by respiratory troubles, by circulatory disturbances secondary thereto, and by metabolic disorders which respond to no specific treatment other than, perhaps, anti-rabies vaccine and immune serum. Were it found possible to prolong the survival time long enough to enable vaccine and serum to exert a neutralizing effect on the virus affecting the nervous centres, hope of cure for the patient with a developed attack of rabies might be entertained. It was with this hope that the authors treated a case in the acute phase of the disease by maximal curarization and positive pressure endotracheal ventilation, using Engström's apparatus.

A 65-year-old Algerian male, a Moslem, who had been severely bitten on the right hand and forearm by a rabid dog and who had completed a course of 15 vaccine injections begun 2 days after the time of biting, showed first symptoms of rabies 45 days after exposure to infection and was admitted to hospital 3 days later with a fully developed attack. In the evening of the day of admission low tracheostomy was performed and a No. 9 Sjöberg cannula, with attached air bag and stop valve, inserted. Complete suspension of breathing followed the slow intravenous injection of 24 ml. of Intocostrin (64 mgm.) [a preparation of curare] and at once the Engström apparatus was set going to give 17 respiratory movements per minute and thus supply in that time a theoretical admixture of 4 litres of air and 4 litres of oxygen. As a result, the patient showed complete muscular relaxation, the thoracic expansion was excellent, the vesicular murmur normal, the pulse regular and the blood pressure satisfactory. This improvement was maintained for 4 days, during which freedom of the air passages was assured by periodic aspiration of secretions, complete muscular relaxation by continued intravenous administration of Intocostrin, and nutrition by intravenous profusion of

appropriate materials—saline plasma, whole blood, etc. During this period penicillin in a daily dosage of 2,000,000 units was given intramuscularly, while specific treatment—an initial single injection of 20 ml. of immune serum, followed by a daily injection of vaccine—was also administered. On the fifth day, however, mechanical mishaps, including the bursting of the air bag attached to the Sjöberg cannula, led to the development of a massive atelectasis of the right lung, with consequential dilatation of the right heart and ventricular incompetence, from which the patient died on the eighth day in hospital, *i.e.* on the eleventh day after the onset of rabies symptoms.

Despite the outcome of this, their first trial of the method described, the authors are not discouraged and believe themselves to be justified in repeating this line of treatment in future cases of declared rabies in man. The outcome in the case described might well have been different had the bursting of the air bag—due to an error in technique—with consequential bronchial obstruction not occurred, and had the curarization been, as was the intention, discontinued on the tenth day. In any event, thanks to the treatment given, the patient survived for 11 days after the onset of rabies—to the authors' knowledge the longest survival period yet recorded—and died without the suffering ordinarily associated with a developed attack of human rabies. *G. Stuart*

Sánchez Domínguez, A. Estudio comparativo de la vacunación antirrábica. [**Comparative Study of Anti-Rabies Vaccination**] *Rev. Sanidad e Hig. Pública.* Madrid. 1957, Sept.–Oct., v. 31, Nos. 9/10, 433–75, 7 figs. on 3 pls.

The author gives a detailed report of the methods and the results obtained by the Anti-Rabies Service in Madrid. There were 4 fatal cases among 8,177 bitten persons vaccinated by the Hogyes method (mortality 0·48 per 1,000) in the period 1940–55 and 2 among 3,136 treated by the Semple method (mortality 0·63 per 1,000). Among 11,310 cases observed, infection was derived from dogs in 9,141 and from cats in 1,960 instances. 4 of 1,252 persons with deep wounds died after treatment by the Hogyes method (mortality 3·19 per 1,000), and 1 of 852 treated by the Semple method (mortality 1·17 per 1,000). There were 3 and 2 instances, respectively, of neuroparalytic accident among persons treated by the two methods. *D. J. Bauer*

Kitselman, C. H. **The Influence of Certain Antibiotics and Acidity on Rabies Virus.** *J. Amer. Vet. Med. Ass.* 1958, Apr. 15, v. 132, No. 8, 325–7.

The inactivating effect of various antibiotics on 8 strains of rabies virus has been studied with the object of selecting a suitable preparation for

treating pathological material contaminated with bacteria before inoculating it into animals. The infected material was made into a 10% suspension with 3 cc. of saline containing 10 mgm. of the antibiotic under test, and after clarification by low-speed centrifugation for 10 minutes the supernatant fluid was injected intracerebrally into mice, rats and rabbits. Under these conditions oxytetracycline hydrochloride did not inactivate rabies virus, and satisfactory results were obtained with putrescent material inoculated 60 minutes after addition of the antibiotic. Rabies virus was inactivated by tetracycline hydrochloride, but this was found to be due to the low *p*H of the solution. *D. J. Bauer*

Nikolitsch, M. & Jelesitsch, Z. Über die Interferenz des Immunserums und der Vakzine bei der antirabischen Behandlung. [**Interference between Immune Serum and Vaccine in Anti-Rabies Treatment**] *Arch. f. Hyg. u. Bakt.* 1958, Mar., v. 142, No. 2, 99–104.

In an experimental study of interference between rabies vaccine and rabies antiserum groups of mice were inoculated with rabies antiserum intraperitoneally, rabies vaccine subcutaneously, and with both preparations, and resistance was tested 1 and 10 days after treatment by intracerebral challenge with serial dilutions of fixed rabies virus. In a further group of mice combined immunization was carried out 1 day after infection. In the groups infected 1 day before and 10 days after immunization the protection index in the mice treated with vaccine and antiserum was about 1 log unit lower than in those treated with vaccine or serum alone. *D. J. Bauer*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Won, W. D. & Lien, O. G., Jr. **Fish Hydrolyzate Media for** *Pasteurella pestis*. *Amer. J. Hyg.* 1958, July, v. 68, No. 1, 81–4, 1 fig. [12 refs.]

The casein hydrolysate medium of Higuchi and Carlin [this *Bulletin*, 1957, v. 54, 952] produces high cell yields of *Pasteurella pestis*. The medium here described, though not giving such high yields, offers certain advantages and is a satisfactory alternative to casein.

The paper reports on a commercially available acid hydrolysate of

sardine granules (a footnote says it is no longer available) and a laboratory-prepared fish acid hydrolysate (LFH) from menhaden (*Brevootia tyrannus*) meal.

To prepare the LFH 100 gm. of menhaden meal were mixed with 400 ml. of 3·5 NH_2SO_4 and autoclaved at 121°C. for 3 hours; the insoluble residue was removed by vacuum filtration and the hydrolysate treated with sufficient base-regenerated acid-adsorbing resin to raise the *p*H to between 3·0 and 5·0; the resin was then removed by filtration and the hydrolysate assayed for total solids. The total solid content of LFH was usually in the range of 15 to 18%.

The final medium consisted of 3% LFH solids to which were added 0·36 M of KH_2PO_4, 0·003 M sodium citrate and 0·5% corn starch.

This medium was superior to the commonly used heart infusion broth and the virulence of the organisms was comparable to that of organisms grown in the heart infusion broth. Cultures stored at 5°C. in 100 ml. quantities showed no appreciable loss of viability or virulence in 2 weeks.

P. A. Clearkin

Ogg, J. E., Friedman, S. B., Andrews, A. W. & Surgalla, M. J. **Factors Influencing the Loss of Virulence in** *Pasteurella pestis*. *J. Bacteriology*. 1958, Aug., v. 76, No. 2, 185–91, 1 fig. [11 refs.]

The experiments described in this article confirm views expressed in a former work that loss of virulence in aerated broth cultures of *Pasteurella pestis* is due to selective conditions favouring the growth of avirulent mutants and that this selective effect can be prevented either by addition of certain filtrates of bacterial cultures or more simply by adjusting the *p*H to 7·8 or 8·0. Avirulent mutants can be inhibited or prevented if the culture is incubated under diminished oxygen tension or in a Cellophane bag in the peritoneal cavity of a guineapig. Mixed inocula of various ratios of virulent to avirulent cells grew well in the Cellophane sac *in vivo* and gave no evidence of selective growth of either virulent or avirulent organisms. Avirulent cultures *in vivo* remained avirulent even after 14 or 15 generations of growth.

Addition of filtrates from culture of an avirulent strain in heart infusion broth to the cultures of virulent strains prevented or reduced their attenuation.

Experiments indicated that there might be two separate mechanisms for maintaining the equilibrium between virulent and avirulent cells in aerated broth cultures started from small inocula and incubated at 37°C. Firstly, the virulent organisms grow as rapidly as the avirulent at *p*H 7·0 if supplied with an unknown factor present in the filtrate from avirulent cultures. The unknown factor must be present in a definite concentration to exert its full effect. Secondly, virulent cells are able to multiply as rapidly as avirulent in an alkaline medium (*p*H 7·8 to 8·0). As little as *p*H 0·2 difference in the initial value could markedly influence

the LD50 of the culture. Still further, it was found that treatment of certain broth cultures with sonic vibrations increased the concentration of the unknown factor.

Heart infusion broth culture filtrates of *Pasteurella pseudotuberculosis*, *Escherichia coli*, and *Shigella sonnei* also possessed a factor which prevented selection of avirulent mutants in aerated broth cultures of virulent *P. pestis* started from small inocula. These factors may be similar to the one present in the filtrate from the avirulent *P. pestis* strain used in the experiment. *P. A. Clearkin*

Heckly, R. J., Anderson, A. W. & Rockenmacher, M. **Lyophilization of *Pasteurella pestis*.** *Applied Microbiol.* Baltimore. 1958, July, v. 6, No. 4, 255–61, 5 figs.

Lyophilization has not always proved satisfactory for preservation of *P. pestis* though it is a generally accepted method for long-term preservation of stock cultures of viruses and bacteria. These studies were undertaken to determine some of the factors which affect viability of *P. pestis* during and after lyophilization.

Addition of albumin, methocel, starch, cysteine and ascorbic acid to broth cultures had little or no protective effect during lyophilization and subsequent storage. The conventional method of shell-freezing at −78°C. before lyophilization resulted in significantly lower survival than after snap-freezing or pre-cooling. Survival rate was higher at *p*H 7·6 than at *p*H 7·2 or 7·0. Glucose, sucrose and lactose were about equally effective in maintaining vitality but the viability of *P. pestis* cultures to which glucose had been added decreased rapidly after one month's storage at room temperature. Lactose and sucrose were more effective in maintaining viability.

Rubber stoppers are permeable to air and moisture. After 7 months' storage in rubber-stoppered bottles the moisture had increased from 0·2% to approximately 8%. The stoppers were more permeable to water than to air since the pressure within the bottles increased from 0·02 mm. mercury to only 150 mm., whereas the moisture content approached equilibrium with that of the atmosphere. Addition of calcium or magnesium chloride to absorb moisture and minimize its effects did not lengthen survival time. As might be expected, survival was better in sealed glass vials than in rubber-stoppered bottles. Immediately after reconstitution of cultures stored 9 months in rubber-stoppered bottles, the LD50 dose was 7,700 organisms, while the LD50 of cultures stored 15 months in glass ampoules was only 450 organisms. An unexpected finding was, however, that as the interval between reconstitution of the lyophilized cultures and testing was increased (up to 32 hours) the virulence increased, approaching the original virulence of about 15 organisms per LD50.

Survival of lyophilized *P. pestis* during prolonged storage was affected by moisture and perhaps air and to a lesser extent by storage temperature.

P. A. Clearkin

Quan, S. F., Von Fintel, H. & McManus, A. G. **Ecological Studies of Wild Rodent Plague in the San Francisco Bay Area of California. II. Efficiency of Bacterial Culture compared to Animal Inoculation as Methods for detecting *Pasteurella pestis* in Wild Rodent Fleas.** *Amer. J. Trop. Med. & Hyg.* 1958, July, v. 7, No. 4, 411–15. [17 refs.]

Usually *Pasteurella pestis* infection of fleas collected in nature is extremely low and determination of infection rates by culturing fleas individually is tedious and time-consuming. An alternative procedure, usually recommended, is inoculation of laboratory animals with an aqueous suspension of pooled flea triturates [this *Bulletin*, 1956, v. 53, 1338]. The authors carried out a series of experiments to determine the efficacy of each of these two procedures.

Fleas were collected from live trapped rodents in a sylvatic plague focus in California. They were brought to the laboratory in tubes containing 2% NaCl and 0·01% Tween 80, stored at 4–10°C. for periods of 1 to 5 days before identification, then placed in individual tubes. Each flea was crushed with a sterile glass rod; 0·2 ml. sterile distilled water was added and a suspension made with the rod which was used then to streak a blood agar plate. The suspensions of fleas remaining after culture were pooled and inoculated subcutaneously into either mouse or guineapig.

1,297 fleas were cultured individually, the suspensions pooled and inoculated into 319 mice. By culture of individual fleas, 78 were proved to harbour *P. pestis*, while by animal inoculation at least 21 others were proved positive. Assuming that only 1 positive flea was present in each of the 21 positive pools, a total of at least 99 fleas or 7·6% of the fleas tested harboured plague bacilli. Based on these results the range of efficiency for finding plague bacilli in fleas by animal inoculation varied from 59 to 98%, average 89%. The range for culture varied from 68 to 87%, average 79%.

Animal inoculation is a simple method and is highly efficient but the results are not available for 3 to 10 days and the quarters required for infected animals limit the number of inoculations possible. Individual inoculation of large numbers of fleas would be prohibitive. In favour of culture, most of the results are ready in 18 hours, animal facilities are not required, large numbers of fleas can be individually tested and average efficiency is high though less so than with animal inoculation.

The method of choice remains animal inoculation, but for critical study of epizootic plague among rodents and their fleas individual culture provides invaluable data.

[For Part I, see this *Bulletin*, 1958, v. 55, 763; and note, *ibid.*, 1108.]

P. A. Clearkin

Halcrow, J. G. **Fleas of the Rat in Tanganyika.** [Correspondence.] *Nature*. 1958, Sept. 20, v. 182, 817.

The following species were collected:—

Fleas	No. collected	Percentage of collection
Xenopsylla brasiliensis (Baker)	723	71·72
Xenopsylla cheopis (Rothschild)	220	21·72
Leptopsylla aethiopicus (Rothschild)	18	1·77
Ctenocephalides felis strongylus Jordan	16	1·58
Echidnophaga gallinaceus (Westwood)	12	1·18
Dinopsyllus longifrons lypusus J. and R.	7	0·69
Pulex irritans Linnaeus	6	0·59
Ctenophthalmus cabirus Jordan	6	0·59
	1,008	

Voelckel, J. La répartition des espèces. *R. norvegicus* et *R. rattus* à Douala. [**Distribution of Species of** *Rattus norvegicus* **and** *R. rattus* **at Douala, French Equatorial Africa**] *Méd. Trop.* Marseilles. 1958, July–Aug., v. 18, No. 4, 677–82, 2 charts.

The authors studied the rat population in 7 areas in Douala, including Bonabéri which lies on the opposite bank of the river Vuri and has been connected with Douala by a bridge since 1955.

In 1956 and 1957, respectively, 1,603 and 909 rats were captured and identified. The results are shown in 2 maps and 7 tables, which include findings of *Rattus norvegicus* and *R. rattus* from 1940 onwards.

In Douala, apart from Bonabéri, *R. norvegicus* increased from 55% in 1948 to 92·5% in 1957, with a slight decrease between 1952 and 1954. In the different sectors the percentages varied from 35·9% to 93%.

In Bonabéri the increase of *R. norvegicus* was rapid—from 27% in 1956 to 49% in 1957, the majority (69·2%) being found in the port area, while the remaining 30·8% were *R. rattus* in that area. In the town, *R. rattus* were 57·7%. *H. J. O'D. Burke-Gaffney*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

De, S. N., Lahiri Choudhury, P. K. & Mondal, A. **Observations on Epidemic and Non-Epidemic Cholera in Calcutta.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, July, v. 52, No. 4, 349–53, 1 graph.

The authors observe that cholera appears in Calcutta in two guises, as an explosively epidemic disease towards the middle of the hot weather and as an insidious, unspectacular, endemic disease throughout the rest of the year. They have compared the severity of the disease in each period by the examination of the records of two series, each of 100 patients.

The first series of patients were admitted during a 15-day period in May, at the height of the 1956 epidemic, while the members of the second series were received during a 5-month non-epidemic period in the cool season. The two groups were strictly comparable as regards the stage at which they came under treatment.

The authors remark that in the non-epidemic period cholera often simulates an innocuous gastro-enteritis. Various criteria conform in showing that the disease is of enhanced virulence as well as of greater invasiveness in its epidemic form. Thus the case mortality is significantly higher at all ages, the overall mortality of 27% in the 1956 epidemic contrasting with that of 16% in the non-epidemic period. The same trend is seen in the higher incidence of the more prolonged examples of urinary suppression, and this is linked with the greater frequency of death from both shock and uraemia. Diarrhoea was more prolonged during the epidemic period, and, while bile was present in the faeces of a number of non-epidemic cases, the stools of epidemic patients were almost invariably of rice-water appearance. Only in the relative amount of intravenous saline administered to individual people in either group was there no appreciable difference. [This probably reflects the greater medical supervision and nursing care available to patients in the non-epidemic period, for the pressure of work during the epidemic will be appreciated from the statement that as many as 150 cholera patients may be admitted to one hospital in a day.]

The authors speculate as to the part that climatic stress may play by suppressing suprarenal function, and cite their experience of the enhancement of the virulence of experimental infections in rabbits which had been subjected to suprarenal inhibition by cortisone. They make no reference to possible variation in the quality of the causal organism.

[This is a valuable contribution to clinical research on cholera, being clear, concise and well argued. It draws attention to one more of the unsolved problems of this disease.] *J. H. Walters*

Lyles, S. T. & Gardner, E. W. **Studies on the Antigenic Structure of *Vibrio cholerae*. I. The Effects of Heat on the Agglutinating Antigens.** *J. Infect. Dis.* 1958, July–Aug., v. 103, No. 1, 67–74. [21 refs.]

Exposure to steam for 1 hour rendered certain rough and rho type strains of *Vibrio cholerae* agglutinable to intermediate titres by antisera prepared against smooth strains, the rough and rho strains being previously inagglutinable by these sera. Similar results were obtained by steam treatment of smooth strains which before treatment were agglutinated to very low titres or not at all by antisera to rough and rho strains. Absorption tests showed that unheated antigens failed to remove antibody capable of agglutinating heat-treated antigens. Rho antigens, heated or unheated, did not remove antibody in antiserum to rough strains which reacted with heated smooth antigens, suggesting that rho strains lack an antigenic component present in both rough and smooth strains. The heat-labile inhibitor discovered in this work may be related to heat-labile somatic antigens present in other organisms. *R. S. F. Hennessey*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Freedman, L. **The Epidemiology of Amoebiasis in Durban.** *South African Med. J.* 1958, Aug., v. 32, No. 32, 797–8. [11 refs.]

"Though on the evidence available we are unable to rule out completely the possibility that diet plays a part, it seems probable that the bad hygienic conditions under which the Africans live in Durban are the major cause of their high incidence of amoebic dysentery, its complications, and amoebic liver abscess. The ingestion of a very large number of *E. histolytica* cysts, or possibly the simultaneous ingestion of certain types of bacteria from fresh sewage, is the postulated precipitating factor which induces the amoeba to invade the bowel wall."

U.S. Dept. of Health, Education, and Welfare. **Amebiasis. Methods in Laboratory Diagnosis** [Brooke, M. M.]. pp. v + 67, 10 figs. [Numerous refs.] 1958. Atlanta: Public Health Service, Bureau of State Services, Communicable Disease Center, Georgia, U.S.A.

This pamphlet contains the statement "The more a person studies the intestinal protozoa, the more humble he becomes". The development of this opinion, and the critical analysis of methods of examination that follows, will be familiar to readers of this *Bulletin*. Sound practical

advice on the recognition of *Entamoeba histolytica* is given throughout, with a strong bias in favour of a final appeal to stained preparations, expressed in the author's words: "In temporary wet mounts unless indisputably typical characteristics of *E. histolytica* are observed (preferably in the cystic state), the identification should be considered only as tentative. Confirmation in permanently stained slides is essential for accurate diagnostic work". Staining methods are described in full detail.

There are useful suggestions for the type of examination needed under different circumstances. (1) Central diagnostic laboratories, receiving specimens by mail, should supply a postal kit containing two vials for the reception of faecal specimens, one containing 5 to 10% formol saline for the formalin-ether concentration procedure, and the other polyvinyl alcohol (Brooke and Goldman, *J. Lab. & Clin. Med.*, 1949, v. 34, 1554) for the preparation of stained films. (2) For prevalence surveys, the same materials are advised, since they can be used by unskilled workers collecting specimens on the spot, or used by an investigator both for immediate and for reference purposes. (3) In clinic and hospital laboratories more methods are available: (a) microscopy of fresh faeces, preferably repeated 2 or 3 times at intervals of several days; (b) post-cathartic specimens; the first stool should be concentrated by the formalin-ether method, and all stools examined by temporary wet mounts; (c) sigmoidoscopy, followed by examination of the material without delay. A cleansing enema should not be used, and if a cathartic has been given 2 to 3 hours should elapse after purgation. The use of cotton swabs is to be avoided [and so, the reviewer would add, is an excess of fatty lubricant].

In reporting, it is advised that all amoebae should be mentioned by their scientific names. If the species cannot be determined, the report should read "unidentified amoebae found"; an accurate statement of the result of a negative examination is "no parasites found". Possibly mistaken inferences are to be discouraged by not reporting the stages of amoebae found—cysts or trophozoites—at any rate "in most instances".

9 appendices list techniques for preserving, concentrating, staining, and cultivating amoebae, and there is a well selected bibliography.

Alan B. Raper

Levitus, Z. [**Clinical Aspects of Amoebiasis. (An Analytical Review of 445 Cases of the Beilinson Hospital and the Literature)**] *Dapim Refuiim.* Tel-Aviv. 1958, Aug., v. 17, Nos. 2/3, 160–190. [202 refs.] [In Hebrew.] English summary iv–vi.

Lamont, N. McE. & Pooler, N. R. **Hepatic Amoebiasis. A Study of 250 Cases.** *Quart. J. Med.* (n.s.) 1958, July, v. 27, No. 107, 389–412, 10 figs. (7 on 4 pls.) [35 refs.]

The authors, from Durban, state that text-books on clinical medicine describe two distinct entities in amoebiasis of the liver—amoebic hepatitis and amoebic abscess; on the other hand, the text-books on pathology recognize only amoebic liver abscess. The nature of the amoebic hepatitis of the physicians is uncertain; some regard it as the precursor, or early stage, of gross abscess formation; others a condition associated with amoebiasis of the bowel, but not necessarily due to actual infestation of the liver with the causative parasite.

The authors' criteria for diagnosis of amoebiasis of the liver are: (1) enlargement and tenderness of the liver; (2) response to specific (emetine and chloroquine) treatment; (3) suggestive blood findings; (4) suggestive X-ray findings, and (5) the demonstration of pus in the liver.

They consider these criteria in detail and in particular relation to their own patients. Liver enlargement is invariable and is essential to a diagnosis of hepatic amoebiasis. Liver tenderness is directly proportional to the rapidity of progress of the liver swelling and is due to stretching of the liver capsule. Circulatory factors may play an important part in causing liver swelling and tenderness in hepatic amoebiasis, and the tenderness in this condition is usually much greater than is seen in other conditions causing liver enlargement.

A response to specific drug treatment was as consistent a diagnostic criterion of hepatic amoebiasis as was a tender liver enlargement. The majority (154) of the 250 patients responded to it rapidly (within 6 days) by relief from pain, tenderness and fever; 80 responded more slowly; the other 16 died early of complications. The response to specific treatment may be followed by absorption of the abscess contents without their mechanical removal; it is this which may account for a diagnosis of amoebic "hepatitis" when there is in fact abscess formation. The prompt relief of liver tenderness and swelling can be explained by relief from hepatic congestion following the drug treatment.

Blood changes include an iron deficient anaemia, which is unusual in the Bantu population and which is appreciable only in longstanding cases of hepatic amoebiasis, and a leucocytosis (over 15,000 per cmm. in 47% of patients; over 25,000 in 9·5%) which varies inversely with the duration of the liver condition. There was a leucocytosis of 45,000 per cmm. in a patient dying with a bacteriologically sterile amoebic liver abscess; the authors therefore do not accept the dictum that the leucocyte count is a reliable criterion for the differentiation of a pyogenic from an amoebic abscess of the liver. Serum bilirubin was over 0·8 mgm./100 ml. in 19 patients, and of these 6 died; autopsy on 4 of them revealed large abscesses, and it was assumed that these were in part the cause of the jaundice. Some of the highest leucocyte counts were found in those with raised serum-bilirubin levels; consequently the latter is considered to be of serious prognostic significance. Serum alkaline phosphatase and zinc turbidity, and plasma protein levels, were abnormal in several cases.

but the liver function tests of themselves afforded no help in the specific diagnosis of hepatic amoebiasis.

X-ray examination amply confirmed the diagnosis in 202 (84%) of the 242 patients in which it was done. Postero-anterior and lateral radiographs of the chest provide the necessary information without need for screening. In 4 of the 40 patients showing no obvious X-ray changes rupture into the peritoneal cavity had taken place; in another 19 the liver was enlarged downwards and not upwards; among these 23 particular patients there were 7 left lobe abscesses. In the remainder the liver was not markedly enlarged downwards owing to the presence of only small abscesses, to discharge of an abscess into a viscus, or to enlargement of the liver in a horizontal rather than a vertical plane.

The demonstration of pus was made because of spontaneous escape of the abscess contents, or by aspiration. In 10 patients rupture was into the peritoneum, and in one patient directly into the colon. In 9 patients the liver abscess contents escaped into the pleura and in 17 the escape was into the lung (right 13 cases; left 4) and amoebic pus was expectorated. Radiological evidence of pericardial involvement was seen in 7 patients; 5 of these died and in all of them there was a left lobe abscess which had ruptured into the pericardium. Pus was aspirated from the liver lesion in 106 patients, and in 14 of them there was subsequent spontaneous discharge into a viscus or serous cavity. In 13 (12%) of the 106 patients secondary bacterial infection of the abscess cavity was evident when the aspiration was done. A deep-seated abscess and multiple abscess formation may complicate effective aspiration; and in the latter of these eventualities the evacuation of one abscess may facilitate the spontaneous rupture of another.

[This paper is of considerable interest and can with profit be consulted in the original. In the opinion of the abstracter the authors have restated views which for long have been held by British workers, who have employed the term "amoebic hepatitis" purely as a matter of clinical convenience to differentiate the earliest stages of amoebic liver abscess from the later—when gross areas of colliquative necrosis are readily demonstrable. They mean hepatic amoebiasis and nothing less than this; this is in sharp contradistinction to the non-specific "hepatitis" which some continental workers have asserted always occurs in conjunction with intestinal amoebiasis.] *A. R. D. Adams*

Rodrigues da Silva, J. & Tôrres, E. Amebíase hepática. Algumas considerações sôbre os diferentes tipos de agressão amebiana ao fígado. [**Observations on the Different Types of Liver Involvement in Amoebiasis**] Reprinted from *Hospital*. Rio de Janeiro. 1957, June, v. 51, No. 663–84, 9 figs. [42 refs.]

The English summary appended to the paper is as follows:—

"The authors discuss in the present paper the different types of liver

involvement in amoebiases, giving some illustrative examples of them.

"It is admitted that, from the clinical standpoint, there is a precursor stage of the well developed amoebic abscess of the liver, which corresponds to the designation of acute amoebic hepatitis.

"A histologic study of the liver through puncture biopsy in 40 cases of chronic amoebiasis, 7 of which in a acute phase of the disease, is presented. In this study, no specific changes directly related to amoebiasis could be demonstrated. The mild lesion observed which corresponds to the designation of acute amoebic hepatitis related either to the absorption of bacterial products, through the damaged bowel, or to some nutritional deficit coexistent with the parasitic infection or caused by it. The role of other morbid associations in the genesis of these lesions is also discussed.

"A histological picture of a true acute amoebic hepatitis could not be demonstrated, even in cases where some degree of hepatic enlargement and tenderness existed."

Rodrigues da Silva, J. & Tôrres, E. Abcesso amebiano do fígado. Estudo de revixão e apresentação de um caso. [**Amoebic Liver Abscess. A General Review and Account of a Case**] Reprinted from *Rev. Brasileira Gastroenterologia.* 1957, Sept.–Oct., v. 9, No. 5, 215–34, 3 figs. [43 refs.]

The English summary appended to the paper is as follows:—

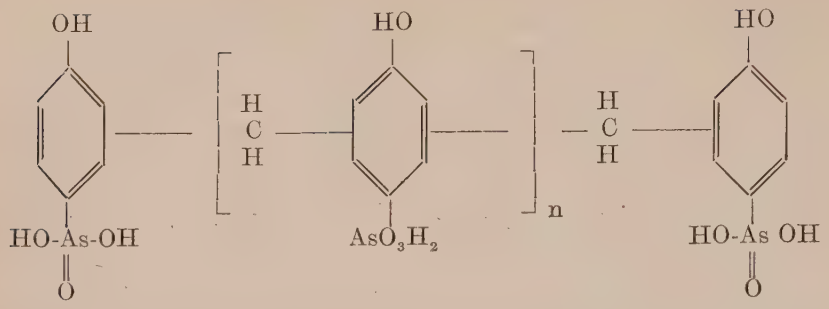
"A general review of the problem of liver amoebic abscess is made, emphasis being given to some diagnostic difficulties met with in the study of the disease.

"A case of liver amoebic abscess, which was only recognised at autopsy is presented and some of its features are discussed.

"The authors call the attention to the fact that this serious complication of amoebiasis is not frequent in Brazil, a tropical country, being more frequent in certain non tropical regions of Argentina and some sections of the U.S.A."

Jones, W. R., Newberne, J. W., Forney, R. B., Begley, R. W., Alexander, W. M., Abreu, B. E. & Weaver, L. C. **Polybenzarsol: a New Amebicide.** *Antibiotics & Chemotherapy.* New York. 1958, Aug., v. 8, No. 8, 400–405, 4 figs. [12 refs.]

Polybenzarsol is formed from the interaction of formaldehyde and 4-hydroxybenzenearsonic acid and consists of a mixture of polymers of the general formula



It has been shown to possess activity against *Entamoeba histolytica* [this *Bulletin*, 1955, v. 52, 45; 1957, v. 54, 1083]. Toxicity studies in rats, mice, dogs and man are reported in the present communication.

One of the striking features of the drug was its low toxicity. The LD50 for intraperitoneal administration in mice was 235 mgm. per kgm. and orally the LD50 was greater than 4 gm./kgm. Data are also given for rats, and daily dosage of 400 mgm. per kgm. given directly into the stomach did not affect growth or cause any gross pathology in these animals. Dogs were given the drug in gelatin capsules and detailed analyses for the estimation of arsenic in urine were carried out. The dosage for man was 2 gm. orally per day for 5 days. Arsenic was determined in blood and urine, and kidney function tests were also carried out. In the urine of man the arsenic level on the above dose was 0·32 mgm. per litre, which in dogs on 200 mgm. per kgm. daily for 4 weeks reached more than 20 times this amount. *J. D. Fulton*

Blay, E. R. **Balantidiasis.** *Med. J. Australia.* 1958, July 26, v. 2, No. 4, 128–9.

The author, from Christmas Island, outlines briefly the incidence, clinical features, diagnosis, treatment and epidemiology of balantidiasis and then describes a case seen in his hospital but not acquired in Christmas Island.

A woman of 33 presented with frequent purulent diarrhoea and nausea. Clinical examination was essentially negative, but balantidia were found in the stools in large numbers. Oxytetracycline produced some clinical relief but did not eliminate the organism: 10 days later a change was made to carbarsone which " in due course led to a cure ". The patient was referred to Australia after this change.

The patient had had her appendix removed 15 years earlier. It was not, however, until 4 years ago that she lived in the Forrest River area of Australia, where she worked with the indigenous people in an environment of poor hygiene and nutrition. She also had occasion, in the course of her work, to handle toads which are a known source of balantidia. It was about this time that the first attack of diarrhoea occurred and the patient recovered clinically in 2 days after " injections ":

the causative organism was not identified and the nature of these injections has not been established by the author. Diarrhoea appeared again in the following year and spontaneous recovery occurred. The patient was in good health until May 1957, when she attended as an out-patient at Christmas Island Hospital with a complaint of headache and malaise. The present illness became apparent 2 months later.

The author emphasizes the potential importance of obscure diarrhoeas.

H. J. O'D. Burke-Gaffney

Ribeiro, A. M. & Barbosa, F. S. Considerações a propósito do primeiro caso de isosporose humana em Pernambuco. [**The First Case of *Isospora* Infection in Man in Pernambuco, Brazil**] *Anais Soc. Biol. de Pernambuco.* 1957, July, v. 15, No. 1, 63–7, 1 fig. [18 refs.]

The English summary appended to the paper is as follows:—

"One case of *Isospora belli* infection is reported from a 14 year old boy living in Recife, Northeast Brazil. Although a rather extensive endemic area of *Isospora* infection exists in Southern Brazilian states, the infection was never reported from Northeast region of the country. Therefore this is considered the first published instance of human *Isospora* infection in Northeast Brazil."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Mooser, H. Erythrozyten-Adhäsion und Hämagglomeration durch Rückfallfieber-Spirochäten. [**Erythrocyte Adhesion and Agglomeration caused by Relapsing Fever Spirochaetes**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 2, 93–111, 19 figs.

The author used two strains of relapsing fever spirochaetes, one a strain of *S. duttoni* and the other isolated from the small race of *Ornithodorus erraticus* in Egypt. Mice infected with these strains were found to show the adhesion phenomenon as soon as spirochaetes appeared in the peripheral blood. There was mutual adhesion of spirochaetes, adhesion of spirochaetes to both red and white cells, and adhesion of spirochaetes to the slide and coverslip. At first the adhesion was so loose that the movement of the spirochaetes was not seriously impeded, but eventually they formed centres of agglomeration of red cells.

When the blood of mice containing numerous spirochaetes was mixed with a drop of broth, immediate macroscopic clumping of the red cells was observed. The cells in these clumps were held together by a network of spirochaetes but after about an hour the spirochaetes became free and evenly distributed between the clumps of red cells, or in some cases rearranged themselves into large agglutinations.

These spirochaetes have lost their ability to adhere to red cells;

agglutination of the red cells by immune serum also interfered with their adhesion to red cells. Homologous immune serum prevented the agglomeration of red cells, while immune serum from a heterologous strain had no effect. *Edward Hindle*

Herrer, A. & Morales, J. Observaciones en le *Ornithodoros forcosus* sobre su posible rol como vector de la fiebre recurrente. [**The Possible Role of** *Ornithodorus furcosus* **as a Vector of Relapsing Fever**] *Rev. Med. Exper.* Lima. 1957, Dec., v. 11, Nos. 1/2, 34–9. English summary.

Tests of infectivity were negative.

See also p. 20, Lapierre *et al.*, Protection de la souris contre une souche virulente de *Trypanosoma gambiense* par certaines espèces de *Borrelia*. [**Protection of the Mouse against a Virulent Strain of** *Trypanosoma gambiense* **by Certain Species of Spirochaetes**]

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Vegas, M. Actuales conceptos en leprologia. [**Modern Conceptions on Leprology**] *Gac. Méd. de Caracas.* 1957, July–Dec., v. 65, Nos. 7/12, 207–372, numerous figs. [11 refs.]

This is a thesis read by the author on the occasion of his admission as a member of the *Academia Nacional de Medicina* in Venezuela.

In the 17 chapters every aspect of leprosy is described lucidly and at length. The clinical descriptions of the various types and forms of leprosy are particularly well explained, and are clearly illustrated with photographs. Much of the teaching is based upon the findings of the VI International Congress of Leprology. Although the main object of the work is to describe the more recent advances in the subject, a good deal of space is devoted to tracing the history of progress made, particularly with regard to treatment.

This work is worthy of being used as a clear and concise exposition of the subject, and should be invaluable to Spanish-speaking physicians, especially in countries where leprosy is endemic. *Ernest Muir*

Mukerjee, N. & Ghosh, S. **Familial Leprosy.** *J. Indian Med. Ass.* 1958, Aug. 1, v. 31, No. 3, 129–31, 5 figs.

A patient 8 years of age appeared with hypopigmented patches, but no sensory changes were detected and a bacteriological smear examination

was negative. Histological examination of skin sections showed infiltration around blood vessels, skin appendages and nerves, with a few epithelioid cells. A few bacilli were found in the granuloma. A diagnosis of leprosy was made. Examination of the family showed that the mother was suffering from the lepromatous form of leprosy, that 3 sisters had the tuberculoid form of leprosy, while on a brother of 10 no lesions were found. The particular danger of young children acquiring the disease when the mother is affected is emphasized. *Ernest Muir*

Hanks, J. H. **Assay of the Fate of Mycobacteria in Cell and Tissues Cultures.** *Amer. Rev. Tuberculosis.* 1958, May, v. 77, No. 5, 789–801, 1 fig. [25 refs.]

Estimations of the number and fate of mycobacteria in cell or tissue cultures are complicated by several factors and in this paper the author summarizes the ways in which microscopical estimations may be misleading, based on observations with macrophage cultures derived from human monocytes and cultures of mouse or rat fibrocytes, infected with human or rat leprosy bacilli.

Although analysis of the distribution of the bacilli per cell shows a marked variation in different explants of the same tissue and an apparent variation in the destructive activity of the cells, a fairly consistent proportion of cells can be infected provided known concentrations of bacilli are added to standard cell populations. The number of bacilli phagocytosed by the cells increases linearly with increases in the number of bacilli, and doubling the number of bacilli added to the cultures increases the number of bacilli per cell by about 14%.

Factors which affect phagocytosis are the maturation of the monocytes to macrophages and the uneven distribution of the cells. Even with a standardized infection, an estimate of the number of bacilli per cell cannot be easily determined by microscopical examination with an oil-immersion lens, not only because of the wide variations in the number of bacilli per cell but also because concentrations of greater than 30 bacilli per cell cannot be counted under these conditions.

Growth and death of the macrophages affect the original distribution of the bacilli in the cells; when the macrophage divides, the phagocytosed bacilli are evenly distributed between the daughter cells and when cells die the bacilli are transferred to living cells, thus giving the impression that multiplication of the bacilli has occurred. Bacilli can be lost from a culture in the cells which become detached from the glass and which are discarded when the culture fluid is changed.

Although the elongation of mycobacteria that invariably occurs before division is fairly reliable evidence of growth, for total counts the author recommends that counts be made on the whole culture, after the macrophages have been disrupted, by placing standard loop-fulls of the culture

on a defined area of a slide and counting the number of bacilli in 15 consecutive fields. *S. R. M. Bushby*

Panja, G. **Pathogenesis and Treatment of Hypopigmented Lesions of Leprosy.** *Indian J. Dermat.* 1958, July, v. 3, No. 4, 150–51.

Depigmented skin patches in leprosy are considered to be due to affection by lepra bacilli in the skin of the sympathetic nerve fibres which control pigment and sweat functions. Anhidrosis is also due to the same cause. Thus local injection of pilocarpine gives scanty sweating in the affected patch, and more profuse sweating in the surrounding skin. The treatment recommended is, in addition to sulphone therapy, careful intradermal infiltration of the hypopigmented area with hydnocarpus oil with creosote. This causes a local reaction followed by return of pigmentation and sweating. *Ernest Muir*

Laviron, P., Beytout, D. & Jardin, C. Traitement synergétique de la maladie de Hansen par de faibles doses de sulfone-mère, de thioacétazone et d'huile de chaulmoogra en injections hebdomadaires. Premiers résultats—Note préliminaire. [**Synergic Treatment of Leprosy with Small Doses of DDS, Thioacetazone and Chaulmoogra Oil, given in Weekly Injections—A Preliminary Note**] *Maroc. Méd.* 1958, June, v. 37, No. 397, 668–70.

It is important that each of these 3 components should be small in quantity in order to avoid reactions, and yet large enough to be effective. The suspension contains 30 gm. each of crystallized thioacetazone and DDS, in 560 ml. chaulmoogra oil with 4% guiacol. [This is set out in the paper as "chaulmoograte d'éthyle: gäiacolé. H. de chaulmoogra: à 4%: 560 ml."] This is sterilized for 3 successive days at a temperature of 70°C., as sterilization in an autoclave is apt to make the suspension painful on injection.

Patients with long standing disease were at once given the weekly dose of 6 ml., while new patients were given successively 2, 4, 6 ml. in a rising scale. The results were judged after a period of 6 months' treatment. All of 28 lepromatous patients showed improvement, to a marked degree in 6. All of 25 tuberculoid patients except 1 showed improvement, to a marked degree in 12. Out of 7 patients with the undifferentiated type of disease 3 showed marked, and 2 slight, improvement, and 2 remained stationary.

Comparison with the various forms of treatment used in the previous year showed better results as regards both the degree and the number of improvements. There is thus evidence of synergic action, and the experiment is considered interesting and worthy of further trial.

Ernest Muir

Floch, H. & Mailloux, M. Traitement de la lèpre par la D-cyclosérine. [**Treatment of Leprosy with D-Cycloserine**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 290–94.

The authors treated 4 patients suffering from the lepromatous type of leprosy with D-cycloserine in the form of 250 mgm. tablets. They gave 1 tablet daily for 5 days, 2 for 5 days, and then 3 tablets continuously. After 9 or 10 months' treatment there was marked clinical, bacteriological and histological improvement. It was found that D-cycloserine does not prevent lepra reaction, and it may even provoke it, but not to a harmful extent.

The authors consider that D-cycloserine has a definite action in leprosy and should have further more extensive trial. While it cannot be considered as a substitute for DDS, it may be used along with sulphones, or as the principal treatment in those who have developed resistance to sulphones. *Ernest Muir*

Floch, H. & Mailloux, M. Relations entre l'apparition rapide de plusieurs cas de lèpre tuberculoide et la vaccination par B.C.G. intradermique chez des enfants en pays d'endémicité lépreuse. [**The Relationship between the Rapid Appearance of Many Cases of Tuberculoid Leprosy and Intradermal Vaccination with BCG in Infants in an Area Endemic to Leprosy**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 353–9.

In 6 children vaccinated intradermally with BCG tuberculoid leprosy (pre-tuberculoid in 1 case) lesions appeared within 1 to 3 months. Out of the total of 3,016 children in the schools 2,325 had been vaccinated; while in the 691 controls who were not vaccinated no leprous lesions appeared.

The authors explain this phenomenon by supposing that in these 6 children a leprosy infection had been incubating, and that the vaccination with BCG, by raising their resistance, provoked local tissue reactions to the infection, thus producing clinical lesions. The authors, however, consider that in an endemic area like Cayenne, where they are working, all children should be vaccinated with BCG during the first 2 months after birth. *Ernest Muir*

Heeren, J. Considérations relatives à l'organisation de la pouponnière de la léproserie de Wafanya et à la mortalité infantile. [**Considerations regarding the Organization of the Nursery at the Wafanya Leprosarium, and the Infant Mortality**] *Ann. Soc. Belge de Méd. Trop.* 1958, Apr. 30, v. 38, No. 2, 179–88.

The nursery was begun in 1948 for the children of leprous parents in the leprosarium in order to ensure partial isolation from time of birth, and thus diminish long and close contact between parent and child. Up to the age of 6 months the mother suckles the child for half an hour

5 times a day, and after this the visits are diminished and other foods gradually given. At the age of 3 years, the child is visited once a week by the parents. Up to the end of 1957 there have been 43 deaths (14·5%) in 296 children. The mortality among breast-fed children was only 13·5%, whereas among bottle-fed children it was 25·9%.

In the nursery African women have been trained by European nurses to enforce discipline among the patients, so that all necessary prophylactic measures against infection are observed. Up to date no cases of leprosy have occurred among the children. *Ernest Muir*

Gunders, A. E. **Progressive Experimental Infection with** *Mycobacterium leprae* **in a Chimpanzee. A Preliminary Report.** *J. Trop. Med. & Hyg.* 1958, Sept., v. 61, No. 9, 228–30, 3 figs.

The results are given of inoculation of a suspension of fresh leproma into 2 chimpanzees. In one of these, which was 2–2½ years old at the time of inoculation, and into which the suspension was injected subarachnoidally, subcutaneously and intradermally, no lesions had appeared up to the time of reporting 14 months after inoculation.

The other chimpanzee was inoculated at the age of 6 to 7 months with the same suspension: 1 ml. was injected through the temporal bone, the tissue round the left ulnar nerve was infiltrated, part was injected intravenously, and the saline in which the nodules had been transported was injected intraperitoneally.

After 11 months there were signs of active leprosy: there were 40 nodules on the hands and up to the elbows, and 62 on the lower limbs below the knees, 12 nodules on the ears, and areas of depigmentation. Sections of nodules showed " epitheloid " [*sic*] cells with large vesicular nuclei, and also fewer smaller cells but no giant cells. Acid-fast bacilli, singly and in bunches, were seen in all sections.

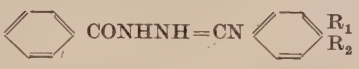
By the end of the 14th month " There was a general tendency for the nodules to regress at all sites ", especially on the ears and upper limbs, leaving depigmentation where nodules had disappeared. In certain areas there was hyperkeratosis circumscribed by circinate infiltrated edges with palpable nodular thickening.

The question is raised why inoculation should have failed in the other animal; was it due to its age or to the different mode of inoculation? [This report is one of considerable importance, and its follow-up may help to throw light on the question of natural resistance to leprosy.]

Ernest Muir

Hirano, N. & Sushida, K. **Chemotherapy of Murine Leprosy. 3. The Effects of Isonicotinoyl-3-Methoxy-4-Ethoxybenzal Hydrazone and Isonicotinoyl-3.4-Diethoxybenzal Hydrazone.** *Yokohama Med. Bull.* 1958, Feb., v. 9, No. 1, 21–5.

In the second paper of this series [this *Bulletin*, 1958, v. 55, 662] it was shown that the activity of isonicotinyl-4-hydroxy-benzal hydrazone against murine leprosy was increased if a methoxy group was added to the 3 position of the benzene ring (No. 254, see table below) and that the activity was increased further by substituting the hydroxy group with a second methoxy group (No. 282). In the present paper the activities of compounds Nos. 254 and 282 are compared with those of their higher homologues and with that of isoniazid in 15 gm. mice infected subcutaneously with *Mycobacterium leprae-murium*; the drugs were administered orally each day, except Sunday, from the fifteenth day of infection for 3 months. Groups of 10 mice were used but as a number of mice died from intercurrent disease the results of the experiment are regarded as preliminary.

General formula 

Drug			Oral LD50 in mice gm./kgm.	Dose mgm./mouse	Murine leprosy experiment				
No.	Substitution				No. of mice surviving	No. of mice with leproma	Number of mice with acid-fast bacilli in:—		
	R_1	R_2					Injection site	Liver	Spleen
254	OCH_3	OH	>3·5	3	10	1	1 +++ 8 ++ 1 +	1 ++ 9 –	1 ++ 9 –
282	OCH_3	OCH_3	2·0–2·5	2	6	1	2 ++ 4 +	6 –	6 –
283	OCH_3	OC_2H_5	>4·5	3	5	1	2 +++ 2 ++ 1 +	5 –	5 –
284	OC_2H_5	OC_2H_5	5·0	3	6	3	3 – 2 + 1 ++	6 –	6 –
Isoniazid			0·25 (approx.)	2	8	2	3 +++ 5 ++	2 ++ 6 –	8 –
Control			—	—	5	5	5 ++++	2 ++ 3 –	3 ++ 2 –

No acid-fast bacilli is expressed as (–), maximal score (++++).

Compound No. 284 showed the most marked suppressive effect and although 3 of the 6 mice developed small lepromas, they were cartilage-like and the few bacilli present stained feebly and they were atypical in form.

S. R. M. Bushby

Kawaguchi, Y., Kanai, K. & Yanagisawa, K. **Kanamycin in Experimental Mouse Leprosy.** *Japanese J. Microbiol.* 1958, Jan., v. 2, No. 1, 95–9, 2 figs.

In the first experiment, groups of mice, infected subcutaneously with a saline suspension of a subcutaneous lesion containing *Mycobacterium leprae-murium*, were treated with Kanamycin, administered intraperitoneally, once daily, 6 days a week. The effects of treatment were assessed by the size of the leproma developing at the infection site and the time of its appearance.

In the control untreated mice the lesions developed in each animal within 6 weeks, reaching a maximum size in 10 weeks, but in those treated with 2 mgm. of Kanamycin, a lesion was palpable in only 1 of the 7 animals at the tenth week.

In the second experiment, treatment with Kanamycin was delayed for 12 weeks after infection. The daily dose was 5 mgm. and it was given 6 days a week for 3 weeks, followed by a week without treatment and then a further 4 weeks' treatment. During the first period of treatment the size of the leproma remained stationary, but it increased during the week of no treatment.

The authors infer from these results that in mouse leprosy Kanamycin is less active than is isoniazid. *S. R. M. Bushby*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*Trematodes *(schistosomes, other flukes);* Cestodes *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* Nematodes *(Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

Sandosham, A. A. **Helminthic Infection in Children with special reference to Malaya.** *Proc. Alumni Ass., Malaya.* 1958, Sept., v. 11, No. 3, 112–15.

A general note on incidence.

Larivière, M., Aretas, R., Raba, A. & Charnier, M. Index d'infestation bilharzienne au Sénégal (Cercles de Thiès et de Kaolack). [**Schistosomiasis in Senegal (Thiès and Kaolack)**] *Bull. Méd. de l'A.O.F.* Dakar. 1958, Apr.–June, v. 3, No. 2, 239–43.

The distribution of schistosomiasis in the Senegal districts of Thiès and Kaolack is described. It is noted that other districts will be investigated in due course. *Schistosoma haematobium* infection is distributed patchily

in both districts. Some foci of *S. mansoni* were found in Kaolack only, but as stool examinations were not always performed its absence elsewhere was not proved. Apart from a note that *Bulinus* (*Pyrgophysa*) *forskali* does not appear to act as an intermediate host of *S. haematobium*, malacological findings are reserved for a later paper. *B. B. Waddy*

Gaud, J. Rôle de la géographie humaine et des activités sociales des divers groupes d'une collectivité dans l'épidémiologie des bilharzioses. [**Human Geography and the Social Activity of Different Groups in the Epidemiology of Schistosomiasis**] *Bull. World Health Organization*. Geneva. 1958, v. 18, Nos. 5/6, 1081–7, 2 figs. [Refs. in footnotes.]

There are still many gaps in our knowledge of the relationship of schistosomiasis epidemiology with geographical factors. One unsolved problem is the absence of the disease from many large areas in which potential vectors are found; schistosomiasis has probably not yet occupied all territory potentially suitable to it. Possible explanations are (1) malacological factors: different susceptibilities to infection of local strains of mollusc, or insufficient mollusc density to maintain the cycle of infection; (2) human factors: differences in local customs, or insufficient population density. Without minimizing the importance of malacological factors, human factors should be considered.

Schistosomiasis is pre-eminently a disease of occupation. In the fellahin of Egypt or the lake fisherman of the Belgian Congo this is obvious, but where it is not so clear-cut the occupational element can be studied through differences in infection rates between ethnic groups and age and sex differences within them. Occupation should not be taken to mean profession only; different habits, especially with regard to bathing, are highly important. So are differences in agricultural practice; *e.g.*, culture of rice in submerged fields gives rise to higher mollusc populations than in irrigated fields, and so does pisciculture in artificial ponds. Increase of population density favours transmission, whereas in sparsely populated areas the disease is sporadic at most. In Africa around the Sahara, on account of the scarcity of water, population density should be related not to total but to cultivated area; if this is done, correlation between schistosomiasis incidence and population density is apparent. [A map illustrates this point.]

Human migration plays a part. Schistosomiasis is the birthright of some races, and in Ubangui-Chari the border between endemicity of urinary and intestinal schistosomiasis corresponds closely with that between peoples of Sudanese and Bantu origin. In Madagascar the distribution of species bears a relation to the inhabitants' origins. Instances have been observed of the disease arriving with imported labourers in areas previously free, and becoming epidemic.

B. B. Waddy

Pitchford, R. J. **Influence of Living Conditions on Bilharziasis Infection Rates in Africans in the Transvaal.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 1088–91.

Infection rates of *Schistosoma haematobium* and *S. mansoni* in young Bantu are correlated with living conditions and water supplies. *S. haematobium* infection rates are independent of whether the people live in reserves, on farms or in towns (sanitated or not), unless safe bathing is provided. *S. mansoni* infection rates are closely correlated with living conditions. Where the population is scattered, as in the reserve areas, or where latrine facilities are provided, the rate is low, 30% or less. It is higher, 60–80%, in congested riverside populations and irrigated farming areas, and highest, 70–100%, in unsanitated towns. The incidence of both species appears to be highest in the Eastern Transvaal and lowest in the Western Transvaal, where only the Rustenburg area was investigated and no case of *S. mansoni* infection was found.

This report is based on an extensive survey of over 5,000 persons.

B. B. Waddy

Watson, J. M. **Ecology and Distribution of *Bulinus truncatus* in the Middle East: with Comments on the Effect of some Human Activities in their Relationship to the Snail Host on the Incidence of Bilharziasis Haematobia in the Middle East and Africa.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 833–94, 1 map. [Numerous refs.]

A very thorough compilation of the available knowledge concerning urinary schistosomiasis in the Middle East is presented by an author whose own work has contributed much to the subject. Information on many aspects of snail ecology, particularly under the special conditions found associated with irrigation systems in the Middle East, is accompanied by indications of gaps in our knowledge and suggestions for further research.

The author speculates on the markedly different ecology of the specimens said to be *Bulinus truncatus* from the Blue Nile, Gojjam Province, Ethiopia, and suggests that their taxonomic status should be reinvestigated. The answer may lie in the inclusion of *B. sericinus* in the list of synonyms for *B. truncatus* at the beginning of the paper; *B. sericinus* is almost certainly a distinct species and is common throughout Ethiopia.]

C. A. Wright

Halawani, A., El Raii, F. & Sadek, G. **On the Morphology and Nomenclature of *Biomphalaria alexandrina* (Ehrenberg, 1831) versus *B. boissyi* (Potiez and Michaud, 1838).** *J. Egyptian Med. Ass.* 1958, v. 41, No. 1, 1–5, 3 figs. on 2 pls.

These authors have found that there are two distinct forms of *Biomphalaria* in Egypt: one is very common and the other very rare,

being found only at Imbaba. The common form is given the name *Biomphalaria boissyi alexandrina* and the Imbaba specimens are referred to *B. b. boissyi*. [Mandahl-Barth (this *Bulletin*, 1958, v. 55, 664) has already shown that the name *boissyi* cannot be used for the Egyptian *Biomphalaria* and that *alexandrina* Ehrenberg is the correct name for this species. Mandahl-Barth also states that *B. alexandrina* exhibits a great range of variability both in shell characters and anatomical features.] *C. A. Wright*

Smith, F. M. & Gelfand, M. **Bilharziasis in the African Infant and Child in the Mtoko District, Southern Rhodesia.** *Central African J. of Med.* 1958, July, v. 4, No. 7, 287–8.

This enquiry is designed to show at what age young children, born in an endemic schistosomal area of Southern Rhodesia, begin to excrete ova. The authors point out that, so long as they are dependent upon their mothers for transportation, infants must necessarily be less exposed to cercariae than older children, yet their risk of infection is not negligible since they are frequently washed in freshly-drawn, unheated river water and are often bathed in small pools at the river side which their mothers visit to wash clothes.

From the age of 4 years, the disease is said to show an increasing frequency with age, though most authorities state that it is usually asymptomatic. The authors have examined also these two statements.

A single stool and urine specimen was obtained from each of 27 infants who were brought to the Mtoko clinic; for comparison, similar specimens were examined from 27 older children at the same clinic. Of the 27 "infants" tested, 8 were below the age of 1 year, 9 between 1 and 2 years and 10 between 2 and 3 years. Ova of *S. hacmatobium* were found in 2 instances, both female children aged $1\frac{1}{4}$ and $1\frac{1}{2}$ years. Ova of *S. mansoni* were not discovered in any child of this group. Of the 4–11 years age-group, 15 out of 27 were excreting ova of *S. haematobium* and 1 ova of *S. mansoni*.

A further group of 63 children between the ages of 4 and 12 years were examined for urinary schistosomiasis only. The incidence of infections rose steadily as age increased, being 47%, 53% and 63% in the 4–6 year, 7–9 year and 10–12 year age-groups, respectively.

An investigation into the symptomatology of early schistosomiasis in childhood was hampered by the poor quality of the evidence available [and since the authors did not address the same set of questions to an uninfected control group, all the information which they have collected cannot with certainty be attributed to schistosomiasis]. In the case of children infected with *S. mansoni*, 20 out of 21 admitted to abdominal symptoms, usually attacks of colic and diarrhoea. Among 47 children carrying *S. haematobium*, 32 were troubled with haematuria, 21 by

dysuria and 16 by frequency of micturition. In either type of infection it would seem that few patients fail to be disturbed by their disease.

The authors suggest that the low incidence of the disease in infancy reflects an inherent resistance derived from the mother who has herself suffered from the disease, rather than to a lower risk of exposure.

[There appears to be some misunderstanding as to the definition of the term "infant", of which the literal meaning is "one who is unable to speak". Though the law would include all those below the age of 21 years, the general medical conception of infancy is that it applies to the first 2 years of life only.] *J. H. Walters*

Alves, W. **Further Studies on the Treatment of Urinary Bilharziasis with Lucanthone Hydrochloride.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 1109–11.

Lucanthone hydrochloride is now the approved name for such preparations as Miracil D, Nilodin, etc. Two series of African patients, all passing viable ova of *Schistosoma haematobium*, were given a standard course of the drug, 60 mgm./kgm. body weight given orally with a drink of water, under constant surveillance, over 3 consecutive days. All patients were ambulant and continued to attend school during treatment.

Series I consisted of 180 boys aged 12–19 years. Weights varied from 40 to 77 kgm. and the total dose of drug from 2·4 to 4·6 gm. The apparent cure rate, after follow-up at 2 weeks, 4 weeks and 6 months, was 90%. 2 boys did not take their final dose on account of nausea and vomiting. Vertigo occurred in 17, sleeplessness in 29. Depression was a common symptom, but often induced by suggestion. One boy was completely disoriented for a day, but this and all other side effects passed off within a week at most.

Series II consisted of 69 children aged 8–14 years. Weights varied from 22 to 65 kgm. 2 children had only 2 days' treatment on account of vomiting: one was cured, the other a failure. These younger children complained of no other side effects, but loss of appetite was observed in 17. The apparent cure rate was 80%.

It is clear that lucanthone hydrochloride will cure urinary schistosomiasis. It is given orally and to ambulant patients, and therefore should be the ideal drug for mass treatment. Gross toxicity can be dismissed, but in Egypt [see Halawani *et al.*, this *Bulletin*, 1949, v. 46, 753] side-effects seem to be more impressive. Chlorpromazine hydrochloride in practicable dosage does not mask the side-effects. *B. B. Waddy*

El-Nagar, H. **Control of Schistosomiasis in the Gezira, Sudan.** *J. Trop. Med. & Hyg.* 1958, Sept., v. 61, No. 9, 231–5, 4 figs.

Irrigation of the Gezira area of the Sudan commenced in the 1920's on completion of the Sennar dam. Inevitably, the system of irrigation

canals, now 5,000 km., became infested with snails at densities up to 1,000 per lineal metre. The human population increased from 135,000 before irrigation to half a million by 1954, with the addition at any time of some 200,000 migrant labourers. The infection rates of *Bulinus* rose to 0·06% and of *Biomphalaria* to 1·2% [this *Bulletin*, 1953, v. 50, 726], and human infection rates increased rapidly to a high figure.

The control methods adopted, after a pilot project described by Sharaf El Din and El Nagar [see *ibid.*, 1956, v. 53, 458] were (i) destruction of snails with copper sulphate; (ii) prevention of ingress of further snails by means of mechanical traps and chemical barriers; (iii) treatment of infected persons with antimony compounds. Snail destruction was carried out by removing vegetation, followed by filling the weeded canals with a known volume of water and applying 30 p.p.m. of $CuSO_4$, $5H_2O$. Immediately afterwards a chemical barrier was set up at the intake end of the treated canals, consisting of copper sulphate in khaki drill bags, arranged so as to maintain permanently a concentration of 0·125 p.p.m. Across the main canal, above the first irrigation canal intake, was fixed a fine mesh screen as a mechanical barrier to reinfestation. This screen is cleaned hourly throughout the 24 hours, and all debris and snails are burned. The initial operation cost £175,000, about £35 per kilometre of canal or 7/- a head of population. Maintenance costs about £70,000 a year, or 2/- a head.

Results are checked by periodic inspection of canals. In a few instances egg masses on vegetable debris pass both mechanical and chemical barriers, but this has not happened often. In the event of reinfestation being found at any point, the canal affected is subjected to re-treatment with 30 p.p.m., for 50 yards up- and downstream. Meanwhile every effort is being made to treat all human cases of schistosomiasis. The ultimate check on results, freedom from infection in the new generation of children, is awaited with confidence.

[This paper describes a notable achievement, and should be read in the original.] *B. B. Waddy*

Harry, H. W. & Aldrich, D. V. **The Ecology of** *Australorbis glabratus* **in Puerto Rico.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 819–32, 1 map.

This paper is a comprehensive account of studies carried out in Puerto Rico on factors affecting the distribution of the local intermediate host of *Schistosoma mansoni*. It was found that the snails are most common in flowing water where the stream gradient is less than 20 metres per kilometre. Such habitats are common in the alluvial areas of the island and it is here that the majority of the schistosomiasis foci are found. The authors suggest that ionic composition of the water may be of importance in determining the distribution of the snails. Large amounts of carbonates and bicarbonates relative to amounts of sulphates and

chlorides may account for their absence in some areas, and traces of zinc and copper may also be limiting factors in waters low in total dissolved solids. Snails are rarely found in waters containing less than 150 p.p.m. of total dissolved solids. Concentrations in excess of 1·0 p.p.m. of zinc, copper, cadmium or silver in distilled water are usually lethal to snails.

No organisms were found which might prove useful for biological control of *Australorbis*, although the size of populations is undoubtedly limited by natural enemies. *C. A. Wright*

Buttner, A. Le complexe "mollusque-schistosome" au Brésil. [**The Mollusc-Schistosome Complex in Brazil**] *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 909–29, 5 figs. [Numerous refs.]

The author gives a review of the distribution of *Schistosoma mansoni* and its intermediate hosts in Brazil. The types of habitat occupied by the snails are described and the distribution related to climatic conditions. The principal foci of human infections are reported from the densely populated areas near to towns and from the large farms in the country districts. The importance of itinerant labourers as agents distributing the infection is emphasized and the part played by animals, both wild and domestic, as reservoir hosts is also discussed. The enormous difficulties involved in the control of schistosomiasis in Brazil are emphasized and the author suggests that only social improvements and the raising of the standard of living of the working people can provide a solution. *C. A. Wright*

Barbosa, F. S. & Olivier, L. **Studies on the Snail Vectors of Bilharziasis mansoni in North-Eastern Brazil.** *Bull. World Health Organization.* Geneva. 1958, v. 18, Nos. 5/6, 895–908. [58 refs.]

The distribution of *Australorbis glabratus* and *Tropicorbis centimetralis* in the state of Pernambuco, Brazil, is related to the physical and climatic conditions of the region. The life cycles and capacities for infection with *Schistosoma mansoni* of these two species are described. Particular attention is given to the ability of *A. glabratus* to survive desiccation and to the effects of this desiccation on the larval schistosomes parasitizing the snails. The epidemiological importance of this drought resistance is emphasized. *C. A. Wright*

Ruiz, J. M. Contribuição ao conhecimento dos planorbídeos da cidade de São Paulo. [**Observations on Planorbids in the City of São Paulo**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Jan., v. 9, No. 1, 57–65, 1 map. [40 refs.] English summary.

Magalhães Neto, B. & De Almeida, A. M. Influência da dessecação sôbre o teor de glicogênio dos tecidos em *Australorbis glabratus*. [**Influence of Desiccation on the Glycogen Level of the Tissues of** *Australorbis glabratus*] *Publicações Avuls. Centro Pesquisas. Aggeu Magalhães*. Recife, Brazil. 1956, v. 5, 1–5, 1 graph. [11 refs.]

The English summary appended to the paper is as follows:—

"Studies on physiology of desiccation demonstrated that when the snail *A. glabratus* is kept out of water the glycogen content of different organs shows a marked decrease.

"In the digestive gland stomach and ovotest, after fifteen days, the glycogen content dropped to less than 50% and at the end of the experiment, before the death of the animals (75 days), attained the figures of 10 to 15%. In the foot [*pé*] the glycogen loss was much less marked. (Table I.)"

i. Kloetzel, K. & Kloetzel, Judith. A síndrome hépatoesplenica na esquistossomose mansônica. Considerações sôbre uma série de 119 casos. [**I. The Hepatosplenic Syndrome in Mansonian Schistosomiasis. Observations on 119 Cases**] *Rev. Brasileira Med.* Rio de Janeiro. 1958, Mar., v. 15, No. 3, 172–8, 1 fig. English summary.

ii. ————————. A síndrome hépato-esplênica na esquistossomose mansônica. (Considerações sôbre a incidência familiar.) [**II. The Hepatosplenic Syndrome in Mansonian Schistosomiasis. Observations on Familial Incidence**] *Rev. Brasileira Med.* Rio de Janeiro. 1958, Apr., v. 15, No. 4, 263–5. English summary.

i. The authors studied 119 patients with splenomegaly in Gameleira, Pernambuco, Brazil, where *Schistosoma mansoni* infection is widespread, but kala azar and malaria are not endemic. The patients were aged 10 years to 40 or more, and the grades of splenomegaly were determined by Hackett's classification: enlargement of the liver was similarly estimated. The degrees of splenic enlargement were studied in relation to age and sex and in some cases palpation was repeated on a second occasion. The findings were also studied in relation to haemoglobin levels, leucocyte counts and the formol-gel test. Faeces were examined for *S. mansoni* ova and the results recorded in relation to age and sex.

The results are shown in 10 tables and a figure, and discussed.

Splenomegaly in schistosomiasis was found early in life—more than half the patients were under 20 years, and most of them were between 15 and 20. Ova were found most frequently in those aged 10 to 15, but were discovered first at about 3 years, while splenomegaly was not usually detected before 10 years. It is suggested that a period of 5 to 7 years is needed between infection and clinical signs of splenomegaly. In those patients who were re-examined after some months it was found that

sometimes the spleen enlarged fairly rapidly. It reached its largest size at about 25 to 30 years: thus it would seem that it took some 10 years for the spleen to reach maximum size. All but one of the patients with haematemesis or signs of uncompensated cirrhosis had spleens of grades 3 or 4, so that splenomegaly seemed to run parallel with the severity of the disease. Only slight enlargement was seen in those older than 40 years; this has not yet been explained.

Haematemesis occurred in 11% of patients (appearing at about 30 years), and ascites or oedema in another 11%. No correlation was found between the size of the spleen and the size of the liver. Haemoglobin levels were lower in those with the largest spleens, but severe anaemia was rare. The leucocyte count was inversely proportionate to the size of the spleen.

The total incidence of splenomegaly in the series was 7·5%.

ii. The author was struck by the high familial incidence of splenomegaly in patients with *S. mansoni* infection. In the case of 21 patients, family members were seen and in this way 3·2 persons per family were studied: in 76% of cases, at least 2 members of the family had enlarged spleens, although they were mostly without symptoms. 3 families were studied in detail and the findings are tabulated.

The author discusses these findings. He is not satisfied with the obvious explanation of similar chances of massive infection in families since (a) the local population lead a nomadic life and the first exposure of a child to infection—which is generally believed to be the important one—differs among the children, (b) the age difference between members of a family having enlarged spleens is often considerable—up to 19 years in one case—so that similar conditions would hardly have prevailed at the different periods, (c) the region is dry and the whole population uses the few available sources of water. Habits are more similar within an age-group than within a family, yet the local incidence of splenomegaly was no more than 7·5%. The author finds the theory of hereditary predisposition attractive, but admits that more knowledge is required before it can be accepted. *H. J. O'D. Burke-Gaffney*

Bogliolo, L. **Splenoportography in Hepato-Splenic Schistosomiasis mansoni.** *Ann. Trop. Med. & Parasit.* 1958, July, v. 52, No. 2, 181–5, 7 figs. on 2 pls.

Transparietal splenoportographic examinations were done on 3 hospital patients in Brazil suffering from the Symmers' type of hepato-splenic schistosomiasis. The contrast medium used was 40 ml. of 70% Cilatrast, and the radiographs were taken immediately after its intrasplenic injection; in 2 of these patients with schistosomiasis the spleen was surgically removed on the same day. Splenoportographs of other liver lesions in various patients were done for purposes of comparison. Livers

obtained at autopsy were injected through the portal vein with the contrast medium, and vinyl-acetate casts also were prepared from 7 cases of Morgagni-Laënnec's cirrhosis, a case of post-hepatic cirrhosis, a chronic cardiac liver with slight fibrosis, and 3 cases of epithelioma of the liver.

From autopsy studies it was shown that the X-ray pictures of the liver after intrasplenic injections of contrast medium closely conformed to the appearances of the vinyl-acetate casts, and both these clearly demonstrate the periportal vascular network which is present in the Symmers' type of case. In the 3 patients with this lesion rather indefinite but parallel shadows could be seen around clearly defined intrahepatic dichotomic branches of the portal vein; these are due to this periportal vascular network. Where this latter is very indistinct the outlines of the dichotomic branches also are indistinct.

The author suggests that it is possible that two other morbid entities of the liver might cause somewhat similar periportal shadows. These are infections of the biliary ducts with flukes (*Clonorchis*, *Opisthorchis* and *Fasciola*) which cause duct dilatation, and possibly in certain cases some new vessel formation in the periductal plexus; and "cavernous transformation of the portal vein" initiated by portal obstruction. The latter leads to much new vessel formation. In this particular condition splenoportal radiography might be expected to yield indistinct outlines of some of the intrahepatic branches of the portal vein, but it is probable that this is the only point of similarity with Symmers' type of hepatosplenic schistosomiasis. [See also this *Bulletin*, 1957, v. 54, 977.]

A. R. D. Adams

Rodrigues da Silva, J. Aspectos básicos relativos à terapêutica específica na esquistossomose mansoni. (Estudo de revisão, com referência especialmente à quimioterapia antimonial por via parenteral.) [**Review of the Basic Aspects of the Specific Therapy of *Schistosoma mansoni* Infections, with Special Reference to Parenteral Therapy with Antimonials**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, July, v. 9, No. 3, 417–35. [62 refs.]

The English summary appended to the paper is as follows:—

"In the present paper, the author analyses the aspects considered basic regarding the problem of schistosomiasis mansoni, in what concerns its specific treatment. After a historical summary about therapy of human schistosomiasis, beginning from the tartar emetic till the most modern antimonials and thioxanthones, the author goes along studying the indications and counter-indications of the mentioned treatment, not before, however, of approaching the controversial problem represented by the 'objections to the specific treatment of schistosomiasis'. In the basis of a great number of opinions the author concludes by the invalidity, at least in its general sense, of the reasons evoked by the objectors to the

mentioned treatment. The author, however, calls the attention to some possible complications of the specific therapy in special cases, if some facts are not taken in consideration, whose knowledge is necessary and which establish limitations to the indiscriminate practice of stibiotherapy and even the thioxanthone therapy.

"Further, the mechanism of schistosomicidal drugs and the criterion of cure that governs the matter are discussed and analysed."

Magalhães Neto, B., Calado, O. B., Barbosa, J. de M. & De Almeida, G. R. O "efeito de grupo" na ação moluscocida do pentaclorofenato de sódio e do sulfato cúprico. ["**Group Effect" in the Molluscicidal Action of Sodium Pentachlorophenate and Copper Sulphate**] *Anais Soc. Biol. de Pernambuco.* 1957, July, v. 15, No. 1, 73–82. [14 refs.] English summary (5 lines).

The authors have carried out a most interesting series of experiments in which they have demonstrated that the Brazilian snail *Tropicorbis centimetralis* is more easily killed by solutions of sodium pentachlorophenate and copper sulphate when treated in groups of 100 than when treated individually, the volume of solution per snail being the same (3,000 ml. for groups of 100 and 30 ml. for isolated specimens). These results are opposed to those obtained from previous work on other animals in which there is usually a protective effect against toxic substances associated with grouping of individuals. Additional experiments in which groups of snails were placed in two solutions of sodium pentachlorophenate, one fresh and one in which a group of snails had already been killed, showed no significant differences between the molluscicidal activity of the two solutions. *C. A. Wright*

Collins, R. F., Davis, M., Edge, N. D. & Hill, J. **The Schistosomicidal and Toxic Effects of some αω-DI(*p*-Aminophenoxy) Alkanes and Related Monoamines.** *Brit. J. Pharmacol. & Chemotherapy.* 1958, Sept., v. 13, No. 3, 238–43. [11 refs.]

"An account is given of the results obtained with a number of *p*-aminophenoxyalkanes which were examined for activity against *Schistosoma mansoni* in mice and for the presence of retinotoxicity in cats. The first compound to be found active, 1:5-di(*p*-aminophenoxy)-pentane dihydrochloride (M & B 968A), was modified in a variety of ways in an attempt to increase its activity and to eliminate its ocular effects. It was found that a *p*-aminophenoxyalkyl group was common to all the active compounds, but that the rest of the molecule could be any of several different groups, including alkoxy, phenoxy, and phenyl groups, without diminishing the activity. Although at least one *p*-aminophenoxyalkyl group was

essential for schistosomicidal activity, ocular toxicity was also shown by a *p*-aminophenylalkyl derivative in which the ether linkage was absent.''

Coutinho-Abath, E. & Jampolsky, Ruth. Comportamento das cercárias de *Schistosoma mansoni* na infestação experimental de animais refretários. I.—Histopatologia das reações cutâneas observados no pombo doméstico (*Columba livia domestica*). [**Behaviour of *Schistosoma mansoni* Cercariae in Experimental Infections in Resistant Animals. I. Histopathology of Cutaneous Reactions in the Domestic Pigeon**] *Anais Soc. Biol. de Pernambuco.* 1957, July, v. 15, No. 1, 93–125, 16 figs. [Numerous refs.]

The English summary appended to the paper is as follows:—

'' Penetration of the cercariae of *S. mansoni* through the skin of the domestic pigeon (*Columba livia domestica*) was studied.

'' The following aspects were observed in the skin of the animals:

'' *a*) In the stratum corneum the cercariae were disintegrated before any inflammatory reaction and the residuals were eliminated during the normal skin desquamation;

'' *b*) an intraepidermal formation resembling a cyst seems to be organized after the lysis of the Malpighian cells starts. In the cyst cavity can be seen the cercariae, acute inflammatory cells (polymorphonuclear neutrophilic and eosinophilic leukocytes), some macrophages and coagulated plasma. The cyst content is eliminated to the exterior by the rupture of the cyst wall and the damaged skin is restored;

'' *c*) when the cercariae reach the derma and inflammatory reaction is observed, polymorphonuclear neutrophils and eosinophils surround the cercariae in the early stages being replaced later on by lymphocytes, plasma cells and histiocytes. This process is accompanied by morphological alterations of the cercariae, as progressive fading, shrinking and finally the larvae are fragmented and reabsorbed by local macrophages.

'' The histological examination of the lungs, myocardium and liver of the infected animals did not show alterations which could be related to the infection.

'' The intensity of the cutaneous reactions observed in the domestic pigeon shows no doubt about the significance of the superficial layers of the skin (epidermis and dermis) as being the site responsible for the natural immunity of the animal to the infection with *S. mansoni*.''

Chinese Med. J. Peking. 1958, Aug., v. 77, No. 2, 107–11. **The People's Boundless Energy during the Current Leap Forward. I. New Victories on the Antischistosomiasis Front** [Wei, Wen-Po], 107–10. **II. Intensive Tartar Emetic Treatment in Schistosomiasis japonica** [Mao, Shou-Pai], 110–11.

See this *Bulletin*, 1958, v. 55, 183, 549.

Ehrenworth, L. & Daniels, R. A. **Clonorchiasis sinensis: Clinical Manifestations and Diagnosis.** *Ann. Intern. Med.* 1958, Aug., v. 49, No. 2, 419–27. 2 figs. [18 refs.]

"Clonorchiasis is a not uncommon disease as seen in two large teaching hospitals in the eastern United States. Four of the eight cases herein reported were observed by the authors over a one-year period.

"The background of endemic area residence, unexplained eosinophilia associated with symptoms of right upper quadrant abdominal pain, anorexia and weight loss should raise the index of clinical suspicion and prompt diagnostic studies.

"Eight case reports are presented of patients infested with this parasite which demonstrate the clinical spectrum of disease manifestations. A case associated with primary hepatic carcinoma and another presenting with obstructive jaundice and acute pancreatitis have been reported.

"Modes of diagnosis and therapy have been presented and the literature has been briefly reviewed."

Chang, Hung-Tien, Wang, Chi-Wu, Yü, Chih-Fei, Hsü, Chi-Fa & Fang, Jung-Ch'üan. **Paragonimiasis. A Clinical Study of 200 Adult Cases.** *Chinese Med. J.* Peking. 1958, July, v. 77, No. 1, 3–9.

Adult *Paragonimus westermani* may become widely disseminated throughout the human body for they may be found encysted not only in the bronchial tree but also in the brain, the retroperitoneal spaces and in the subcutaneous tissues. The incubation period is difficult to ascertain, as early systemic symptoms are often vague: the authors state that it may range from 1 month to 2 years, with a median period of 6 months. The earliest symptoms commonly arise in the respiratory tract (62·5% of cases), but may be intestinal (20·5%) or may be represented merely by fever (18·5%).

Systemic symptoms, besides fever, comprise loss of condition, lassitude and urticarial eruptions. Respiratory symptoms are dominated by cough, which is present in every case; sputum is usually scanty unless a secondary bacterial infection has supervened, but haemoptysis is nearly always noted sooner or later. This amounted to rusty sputum only in 191 patients, but 9 produced frank haemoptysis. A sense of oppression in the chest was not unusual, while dyspnoea was common; this was due to broncho-spasm in 25 instances and to pleural effusion in 31. Abdominal pain with diarrhoea commonly indicated abdominal encystment of the worms, but in 11% of patients the stools contained blood. *Paragonimus* ova did not appear in the stools unless they were present also in the sputum; they appeared therefore to have come from the lungs. Cerebral involvement is indicated by headache and convulsions, while at a late stage hemiplegia or paraplegia may develop. Out of 200 patients, 52 showed neurological symptoms, which were limited to the

brain in 44, to the spinal cord in 4 and arose from both sites in a further 4 patients. A wide range of ocular symptoms and signs was encountered, ranging from hemianopia to external ophthalmoplegia. Subcutaneous nodules were palpated in 38 patients, being commonly situated over the lower half of the trunk and on the thighs. Examination of 15 nodules removed at biopsy revealed adult flukes in 5 instances, but in the remainder chronic inflammatory changes only were discovered.

Ancillary methods of diagnosis are not very helpful, though a specific intradermal test and complement-fixation test are of great usefulness in cases showing cerebral symptoms of obscure aetiology. [Details of the preparation of the *Paragonimus* antigen are omitted.] The recognition of the characteristic small, operculated eggs in the sputum remains the standard method of diagnosis. In rare instances, they can be observed in the cerebrospinal fluid, and in the contents of subcutaneous cysts. [The development of the flukes in sites other than the lung is of great clinical interest and importance.] *J. H. Walters*

Wibaut-Isebree Moens, N. L. Distomatosis bij de mens. [**Distomatosis in Man**] *Tijdschr. v. Diergeneesk.* 1958, Sept. 15, v. 83, No. 18, 877–84, 1 fig. English summary.

See this *Bulletin*, 1958, v. 55, 668.

Nyberg, W., Gräsbeck, R. & Sippola, V. **Urinary Excretion of Radiovitamin B_{12} in Carriers of** *Diphyllobothrium latum*. *New England J. of Med.* 1958, July 31, v. 259, No. 5, 216–19, 1 fig. [11 refs.]

One of the authors has previously shown that non-anaemic carriers of *Diphyllobothrium latum* (the fish tape worm) absorb only about half as much vitamin B12 as normal subjects (Nyberg, *Acta Haematol.*, 1958, v. 19, 90). The method was to give the subjects radioactive vitamin by mouth and to measure the radioactivity of the stools.

The present paper attempts to check these results by measuring the radioactivity of the urine, which would give a direct indication of the amount of the vitamin which had been absorbed. 57 carriers of *Diphyllobothrium latum*, 7 of them anaemic, 16 patients with pernicious anaemia (*i.e.* persons in whom the failure of vitamin absorption is not due to competition by the intestinal parasites but is the consequence of an inability to absorb vitamin B12) and 50 healthy control subjects were subjected to the urinary radiosensitivity test. There was no doubt that the worm carriers excreted much less vitamin B12 than the normal subjects and that they resembled the pernicious anaemia patients in that respect. The anaemic worm carriers excreted significantly lower amounts than the non-anaemic subjects. After expulsion of the worm a significant increase in urinary excretion of radioactive vitamin B12 could be seen. *H. Lehmann*

De Maria, B. & Beggi, D. Aspetti profilattici e assicurativi dell'anchilostomiasi agricola. [**Agrarian Ankylostomiasis in relation to both Prophylaxis and Insurance**] *Ann. d. San. Pubblica.* Rome. 1958, May–June, v. 19, No. 3, 613–22. [28 refs.] English summary (4 lines).

This is a general discussion of the problem of ankylostomiasis, special reference being made to the question of sickness benefit and insurance provisions generally.

Hookworm is considered an occupational disease of miners and brickworkers and the question of extending the provisions to cover agricultural workers is still under consideration at the Italian Ministry of Labour and Social Insurance. The authors quote figures indicating an incidence of 0·12–43·43% in agricultural workers.

Hitherto occupational diseases, from the social insurance point of view, have not been treated so well as accidents, but the authors consider that as it is impossible to ascertain when the disease was actually contracted ankylostomiasis must be regarded as an occupational disease and not an accident. Detection of infection can be regarded as indicating disease since Giromini and Granati (XIX Congresso Nazionale di Medicina del Lavoro, Firenze, ottobre 1953) found that in 80% of infections the erythrocytes were less than 4 million. In addition, in almost all other countries legislation exists to ensure prevention and protection against it.

W. K. Dunscombe

Nor El-Din, G. **Report on Ankylostomiasis Survey in Iraq, 1954. (With an appendix on the Incidence of other Intestinal Parasites in Iraq.)** *Bull. Endem. Dis.* Baghdad. 1958, Jan., v. 2, Nos. 3/4, 117–37.

The incidence of ankylostomiasis in Iraq was studied by examining schoolchildren. In the villages schoolchildren and others live in the same environment, but in towns schoolchildren may have a higher standard of hygiene and more often wear shoes. Consequently, as regards hookworm infection they may not be typical of the community, but collection of faeces from the general population presented too many difficulties for adoption in this survey.

The most heavily infected areas are Nasryia, Amnara, Kufa, Diwaniya, Basra, Hilla and Baghdad. In Baghdad infection rates were inversely proportional to social status, ranging from nil at high-class schools to 60% in the poor areas, in which sanitation is virtually non-existent. In Basra high average temperature and humidity, and damp soil, especially in palm tree plantations, give ideal conditions for development of hookworm larvae, and infection rates are high. In desert conditions rates are very low. In northern Iraq, where the temperature is low for 8 months of the year and where the earth is dry during the hot season, ankylostomiasis is rare except in immigrants from the south. Ascariasis

however, is very common in the north since *Ascaris* ova are resistant to adverse conditions.

A universal survey of ankylostomiasis followed by mass treatment is recommended. For this purpose, technicians (and physicians) must be trained in diagnosis, and doctors must be encouraged to take up public health careers in the rural areas. The training of medical students in parasitology, and the staffing and quality of the school medical service must be improved. A health education service and a campaign against barefootedness should be started. Latrines must be introduced into the villages and the poorer quarters of the towns. All these measures should go hand in hand with the raising of general hygienic standards.

Details of the findings are given in 3 tables. *B. B. Waddy*

YAMASHITA, M. [**Experiment on Mode of Infection of Hookworms in Human Body**] *Igaku Kenkyu.* Fukuoka. 1958, July, v. 28, No. 7, 2434–9. [26 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"As to the mode of infection of ancylostoma duodenale (AD) and Necator americanus (NA), the opinions of parasitologists are not always agreed.

"In order to decide this question, the proper host (human being) of the hookworms must be used. Four volunteers were selected and mature infective larvae of AD and NA were infected *per os* or *per cutan*. The method and result of the experiment were as follows.

Case	Mode	Kind and number of larvae swallowed or penetrated the skin		Infection	Number of adults expelled	Infection rate of larvae
1. Male 26 yrs old	per os	AD	200	(+)	51	25%
		NA	200	(−)	0	0
2. Male 33 yrs old	per cutan	AD	67	(+)	8	12%
		NA	70	(+)	8	11%
3. Female 35 yrs old	per os	AD	175	(+)	10	6%
4. Female 22 yrs old	per cutan	AD	32	(−)	0	0

"The above result shows that AD can infect the human being either *per os* or *per cutan*, and NA can infect it *per cutan* but failed to do so *per os*."

ZAGO, H., Jr. & BARRETTO, M. P. Estudo sôbre a prevalência e intensidade de infestação por helmintos intestinais em cães e gatos de Ribeirão Prêto, S.P. [**Study of the Incidence and Intensity of Infection of Dogs and Cats with Intestinal Helminths in Ribeirão Prêto, São Paulo, Brazil**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Apr., v. 9, No. 2, 295–304, 3 graphs. [12 refs.]

The English summary appended to the paper is as follows:—

"Postmortem examinations were performed in 81 dogs and 196 cats from Ribeirão Prêto City (State of S. Paulo, Brazil) with a view of determining the prevalence of and the degree of infestation by intestinal helminths.

"All the dogs were infested. Four species were present and their prevalence were: *Ancylostoma caninum*, 98·76%; *Ancylostoma braziliense*, 82·71%; *Dipyllidium caninum*, 55·55%; and *Toxocara canis*, 41·97%. The average intensity of infestation expressed in medians were respectively: 9, 6, 5, and 3.

"All the cats were also infested. Six species were present and their prevalence were: *Physaloptera praeputialis*, 72·44%; *Ancylostoma braziliense*, 70·91%; *Ancylostoma caninum*, 36·73%; *Dipyllidium caninum*, 50·0%; *Toxocara cati*, 48·97%; and *Taenia taeniaeformis*, 20·40%. The average intensity of infestation expressed in medians were respectively: 9, 7, 3, 7, 3, and 3.

"A comparison of the results obtained for dogs and cats showed that the prevalence and mean intensity of infestation by *A. caninum* are much higher in dogs than in cats; however no differences were observed for *A. braziliense* and *D. caninum*. On the other hand the intensity of infestation by *A. caninum* is much higher than the intensity of infestation by *A. braziliense* in dogs, the reverse being observed in cats."

Arthur, R. P. & Shelley, W. B. **Larva Currens. A Distinctive Variant of Cutaneous Larva Migrans due to** *Strongyloides stercoralis*. *Arch. Dermat.* 1958, Aug., v. 78, No. 2, 186–90, 2 figs. (1 coloured on pl.). [22 refs.]

The label of "larva currens" has been bestowed upon a peculiar type of this erratic infection. Although the authors have included a complete list of larvae, helminthic and entomological, which are recognized as causing "larva migrans" [Mackie *et al.*, this *Bulletin*, 1954, v. 51, 1320; Faust, *ibid.*, 1951, v. 48, 840] they are inclined to incriminate the larva of *Strongyloides stercoralis* in this instance.

The patient was a white 46-year-old housewife who developed a pruritic erythematous urticarial lesion of the medial aspect of the left mid-thigh. It progressed from time to time in an irregular serpiginous linear manner. In her left thigh there were tender erythematous serpentine cords which showed periodic urticarial extensions and, together with this, there were enlarged inguinal lymphatic glands. Her oral temperature varied between 99·0–99·6°F. Her blood showed a moderate leucocytosis of 15,600 with 5% eosinophils. The raised urticarial band was over 5 cm. in width and presented a fine but distinct erythematous central linear lesion, and it was possible to watch its advancement within 10 minutes. The lesion stopped moving after some hours, but would resume movement the next

day. The only likely source of infection might have come from celery contaminated with sand which she had washed.

Spraying of the advancing end of the lesion with ethyl chloride had no effect, but an injection of crystalline lyophilized trypsin into the advanced point proved curative. A graph of the route of the larva throughout 3 days vividly illustrates the rapid progress of the lesion, the speed of which varied from 7 to 11 cm. in a few hourly spurts per day.

The authors think that the patient had only a single larva in the skin with a single long continuous tunnel. They employed trypsin because of its known lethal effects on many nematode infections of the intestine. They consider that the pruritus and urticaria resulted in part from the proteinase secretion by the larva. *Philip Manson-Bahr*

South Pacific Commission. Nouméa, New Caledonia. **An Investigation on Filariasis in Niue** [Iyengar, M. O. T.]. *Technical Information Circular No. 30.* 1958, June, 10 mimeographed pp.

Niue lies 300 miles east of Tonga, 350 miles to the south-west of Samoa and 600 miles to the west of Rarotonga. 13 miles in length and 11 in width, it has an area of a little over 100 square miles. The soil is porous and there are no streams or any surface collections of water. The total population is about 4,700 living in 12 villages harbouring between 200 and 1,000 persons. Niue is situated on latitude 19°S. with an equable temperate climate.

This investigation was complicated by an epidemic of Asian influenza which affected one-third of the population. 586 persons of all ages, representing 12·5% of the total, were examined and gross manifestations of filarial disease were observed in 3·4%. 2·7% were positive for microfilariae in the peripheral blood, and 7% of this sample population gave histories of typical attacks of filarial lymphangitis. 4·2% out of 260 males (all ages) showed gross manifestations of filarial disease and the same percentage were positive for microfilariae, while out of 326 females 2·8% had elephantiasis of the leg and 1·5% showed microfilariae. The incidence of filarial disease follows the prevailing rule and rises rapidly in the later age-groups. In persons of the age of 50 and above, 14·6% showed gross manifestations of filarial disease such as elephantiasis of the leg, scrotum or hydrocele. The type of filarial infection is the non-periodic variety of *W. bancrofti.*

Before the present enquiry nothing was known about the mosquito fauna, and enquiry in this direction was rendered difficult by a prolonged drought. Two species only were found: a species of *Aëdes scutellaris* subgroup allied to *Aëdes tongae*—and *Culex sitiens.* The latter is comparatively rare and its breeding-places are restricted to cliffs on the sea-coast. It seems safe to assume that the local form of *Aëdes tongae* is the vector of filarial infection on this island.

It appears that Niue has a lower incidence of filariasis in comparison with other Polynesian Islands of the South Pacific. This may be due to the habits of the local rats which do not damage the coconuts. The second factor is the absence of perennial transmission of filarial infection. The prevalence of the mosquito vector is greatly reduced by the drying up of breeding places and the low atmospheric temperature (max. 83°F., min. 65°F.). The low microfilaria rate may be the result of control measures which have been in operation in Niue. Since January 1956 mass administration of diethylcarbamazine has been enforced. All persons above the age of one year were given a 50 mgm. tablet one day every month. For the control of filarial disease it suffices if the vector is effectively controlled in those areas in which transmission of filarial infection occurs most commonly. The most important breeding places in Niue are artificial collections of water such as cisterns, other receptacles for storing rain water, coconut shells and tins. *Philip Manson-Bahr*

Jordan, P. **Action of Diethylcarbamazine** *in vitro* **on Infective Larvae of** *Wuchereria bancrofti*. *Brit. J. Pharmacol. & Chemotherapy*. 1958, Sept., v. 13, No. 3, 318–20.

There appears to be little known about the action of drugs on the infective larvae of *Wuchereria bancrofti*. The effect of diethylcarbamazine has now been studied. The parasites were obtained from *Culex fatigans*, under conditions made as nearly sterile as possible, after feeding on a patient. Sera containing the drug were obtained from 3 patients after treatment with a dose of 500 mgm. of the drug on two occasions with an interval of 3 hours between. The same sera taken before the drug was given were used as controls in maintaining the larvae. One larva per capillary tube was obtained by mosquito dissection in the human serum and its movements were studied under the microscope several times per 24 hours. The mean life period of each larva in the different sera was recorded. In no case did the concentration of the drug, which was the highest practically attainable, appear to affect the larvae. The mean life of the larvae varied in the three experiments, being longer in the serum of a patient who had not been exposed to filarial infection than in the other 2 cases. *J. D. Fulton*

Laigret, J. & Voisin, H. La Notézine est-elle un emménagogue ? [**Notézine as an Emmenagogue**] *Méd. Trop.* Marseilles. 1958, July–Aug., v. 18, No. 4, 689–93.

Notézine [diethylcarbamazine] has been extensively employed in the campaign against filariasis in French Polynesia. Miscarriages have been attributed to this drug. The authors have paid special attention to this question, but were unable to confirm these charges. They do consider

that it has an emmenagogic action, and its mode of action is not understood. They suggest that further studies are desirable, especially on its effect upon vaginal cytology and its possible hormonal action, for which animal experimentation may be necessary. They suggest that Notézine may have an action upon *Trichomonas vaginalis* which is known to disturb the menstrual cycle. *Philip Manson-Bahr*

Scott, J. A., Macdonald, Etta M. & Olson, L. J. **The Early Induction in Cotton Rats of Immunity to their Filarial Worms.** *J. Parasitology.* 1958, Oct., v. 44, No. 5, 507–11.

Nelson, G. S. & Grounds, J. G. **Onchocerciasis at Kodera Eleven Years after the Eradication of the Vector.** *East African Med. J.* 1958, July, v. 35, No. 7, 365–8.

Garnham and McMahon [this *Bulletin*, 1947, v. 44, 1084] eradicated *Simulium neavei*, the local vector of onchocerciasis, from Kodera, Kenya, in 1946. Later [*ibid.*, 1954, v. 51, 821] they found that transmission had been stopped but that 50% of adults were still infected. This investigation shows a further slight retrogression in active infection in adults, but 11 years after the interruption of transmission onchocerciasis is still a major clinical problem. Over the age of 20, of 119 persons examined 52 had microfilariae in their skin and 91 had definite signs of the disease. Nodules were found by careful palpation in more than 50% of adults, situated as follows: pelvis (53), chest wall (10), head (2). More than 60% had skin changes. Average microfilarial densities were much lower than those recorded in an active onchocerciasis focus, but there was no doubt about the progressive deterioration in the clinical condition of many patients during the last 11 years. Of 45 cases of eye disease, 37 were thought to be caused by onchocerciasis, and 9 out of 11 blind patients had advanced onchocercal lesions. No children born since 1946 were found infected.

It is pointed out that Kodera, the first community in the world to benefit from complete vector control, offers unique opportunities for a study of onchocerciasis in the absence of reinfection. Evidently it is not sufficient simply to eliminate the vector: heavily infected persons should be treated. *B. B. Waddy*

Lewis, D. J. **Observations on *Simulium damnosum* Theobald at Lokoja in Northern Nigeria.** *Ann. Trop. Med. & Parasit.* 1958, July, v. 52, No. 2, 216–31, 4 figs. [26 refs.]

The author has described differences between young and old *Simulium* adults in a previous paper [this *Bulletin*, 1958, v. 55, 297]. Observations on dissections of wild caught *Simulium* in Northern Nigeria are

reported here. It is possible to distinguish parous flies by the presence of corpora lutea in the ovaries, and when the fly is alive parous flies have opaque halteres, and most nulliparous flies have clear halteres. Nulliparous flies tend to lay more eggs than do parous flies and have been found to live longer. Some nulliparous flies from an uninhabited hill top had apparently used up their fat body.

Parous flies tended to be more numerous in catches about mid-day and during the afternoon. Much time was saved when dissecting flies for *Onchocerca* if the nulliparous females were rejected, and out of 121 parous flies dissected in the Lokoja area 10% were found to be infected (4% with elongating larvae). As only about 17% of the flies were parous the infection rate was probably about 2% or less.

B. R. Laurence

Crosskey, R. W. **The Body Weight in Unfed *Simulium damnosum* Theobald, and its relation to the Time of Biting, the Fat-Body and Age.** *Ann. Trop. Med. & Parasit.* 1958, July, v. 52, No. 2, 149–57, 2 figs.

Simulium damnosum females which contain abundant fat body have normally not taken a blood meal and are nulliparous [this *Bulletin*, 1958, v. 55, 297]. Two-hour captures of biting *Simulium* in the Lokoja district, N. Nigeria, showed that heavier flies (mean weight more than 1·05 gm.) were captured early (6–10 hours) and late (14–18 hours) in the day, and that lighter flies (mean weight less than 1·00 gm.) were captured about mid-day (10–14 hours). The percentage of flies biting without fat body was also greatest (35–45%) between 10 and 14.00 hours. The conclusion that older flies bite more in the middle part of the day was supported by the presence of residual eggs and the condition of the Malpighian tubules [*loc. cit.*].

B. R. Laurence

Torroella, J. & Laugraulet, J. La zona oncocercosa de Tiltepec, Oaxaca. (Estudio oftalmológico.) [**Ophthalmological Study of the Zone of Onchocerciasis in Tiltepec, Oaxaca, Mexico**] *Bol. Epidemiológico.* Mexico. 1957, Oct.–Nov.–Dec., v. 21, No. 4, 105–6.

Tiltepec, in the State of Oaxaca, Mexico, is situated in a coffee-growing area. Although there is no apparent malnutrition owing to an abundance of local foods, the people are poorly clothed and exposed to numerous bites from the very large number of *Simulium ochraceum* which abound there.

The authors examined a number of persons in 3 areas for the presence of onchocerciasis (details of examination not given) and particularly for ocular lesions.

The findings may be summarized as follows:

Area	No. examined	Onchocerciasis present	Total	Ocular Lesions Cornea	Iris	Fundus
Yagila	70	65	15	10	6	4
Jossá	42	41	7	5	1	2
Tiltepec	31	31	11	5	8	2
Total	143	137	33	20	15	8

No acute lesions were seen and only 2 blind persons were discovered. [See also this *Bulletin*, 1958, v. 55, 929.]

H. J. O'D. Burke-Gaffney

Yamanaka, T. [**An Immunological Study on** *Gnathostoma spinigerum*] *Igaku Kenkyu.* Fukuoka. 1958, July, v. 28, No. 7, 2043–76, 9 figs. (8 on 2 pls.). [102 refs.] [In Japanese.] English summary.

The author, from Fukuoka, Japan, considered it unlikely that mechanical stimulation by the adult *Gnathostoma spinigerum* or by its third stage larva was sufficient to account for the transient localized oedema which is a prominent feature of gnathostomiasis in man. He postulated that a metabolic product or excretion from the worm may produce an allergic reaction which, with the mechanical stimulation, is responsible for the complicated symptoms.

To test this assumption, he undertook the following experiments.

(1) A whole-body saline extract of the third-stage larvae of *G. spinigerum* was given intradermally to guineapigs and then given intravenously after 24 hours: a haemorrhagic necrosis resembling Shwartzman's phenomenon resulted.

(2) The same extract was given subcutaneously to guineapigs in a daily dose of 0·1 ml. on 3 occasions at intervals of 2 days and a single dose was given 3 weeks later at the same spot: Arthus's phenomenon occurred in the guineapigs.

(3) Extracts of the oesophagus, intestine and body wall from third stage larvae produced both the above phenomena in that order of severity, which indicated that the antigenicity was present mainly in the oesophagus.

(4) Protein and saccharide fractions of the larvae produced Shwartzman phenomenon of equal intensity, but the protein fraction produced a more intense and lasting Arthus's phenomenon than did the saccharide fraction.

(5) The "foster" fluid prepared from the larvae also produced both phenomena and so was presumably also antigenic.

(6) Serum from patients diagnosed as having gnathostomiasis by means of skin reactions produced positive Prausnitz-Küstner reactions, so that passive transfer of allergy is apparently possible: this reaction might be used in the clinical diagnosis of the disease.

(7) Passive transfer of allergy could be made in normal guineapigs by means of serum from infected persons or artificially infected rabbits.

(8) When guineapigs were given the larval extract intraperitoneally or the larvae orally, lethal anaphylactic shock was produced by intravenous inoculation of the extract 3 weeks later.

(9) The same extract was used in a skin test, with trypan blue as an indicator, on rabbits and guineapigs infected orally with the third stage larvae: positive reactions occurred in 20 and 10 days respectively.

H. J. O'D. Burke-Gaffney

Flatmark, T. Trikinosens stilling i Norge i dag. [**The Position of Trichinosis in Norway Today**] *Tidsskr.f.d. Norske Laegeforening.* 1958, Sept. 1, v. 78, No. 17, 841–3, 1 table, 2 figs. [29 refs.] English summary.

In the autumn of 1940, during the German occupation of Norway, 668 German soldiers and 10 Norwegian civilians were the subjects of one of the worst outbreaks in the history of trichinosis. About one-third of the cases were regarded as severe, but there was only one death. This epidemic led to the compulsory trichinosis control which has been in force in Norway ever since. At present trichinosis in man is rare in Norway, and the case reported in detail by Flatmark was imported, as his patient, a seaman aged 42, had contracted the disease abroad. About 60% of polar bears are said to be subject to trichinosis, and in 1943, 15 German soldiers who had eaten a bear were found to give positive serological reactions to it. Trichinosis continues to be rife in Norwegian fox and mink farms, and quite common in wild foxes and rats. The latter are largely responsible for the trichinosis still to be found in pigs. Their addiction to it can be gauged by the notifications based on the above-mentioned control of privately as well as publicly slaughtered swine in Norway. The frequency with which trichinosis has been found in swine between 1940 and 1954 is indicated in Flatmark's Table I which shows that in one county (Rogaland) alone there were as many as 66 such notifications. On the other hand several counties had to be run into one to yield a single case.

The reasons why there is so much of this disease in certain mammals and so little in man are the high level of general hygiene in Norway, the strict *Trichinella* control of swine, the campaign against rats, and the systematic look-out for trichinosis in fur-producing and other domestic animals.

Claude Lillingston

Goldberg, E. **The Glycolytic Pathway in *Trichinella spiralis* Larvae.** *J. Parasitology.* 1958, Aug., v. 44, No. 4, 363–70, 6 figs. [16 refs.]

Zimmermann, W. J. & Schwarte, L. H. **Trichiniasis in Dogs and Cats of Iowa.** *J. Parasitology.* 1958, Oct., v. 44, No. 5, 520–22.

"During the period of March, 1954 through December, 1957, 521 dogs and 50 cats were examined for *Trichinella spiralis*. Ten percent. of the dogs and 6% of the cats contained *T. spiralis* larvae. Infections, as indicated by larval counts, were generally light, although a few heavier infections were found. A definite increase in the prevalence of infection was found in the older groups of animals. There were no differences indicated in the occurrence of trichiniasis as far as sexes or breeds of dogs were concerned."

DEFICIENCY DISEASES

Van der Hoeven, J. A. **Taboos for Pregnant Women, Lactating Mothers and Infants on the North Coast of Netherlands New-Guinea.** *Trop. & Geograph. Med.* Amsterdam. 1958, Mar., v. 10, No. 1, 71–6, 1 fig.

Taboos often prevent pregnant and lactating women and young children from partaking of the highly prized and often exiguous supplies of protein-rich foods. Carbohydrates are much less often the subjects of taboo than are proteins and fats. These taboos are due to the magico-religious value of denial and sacrifice and not to the idea that they may be physiologically harmful.

The people realize that birth and infancy is a time of great danger for mothers and children. The spirits of those who have died an early or "unnatural" death are jealous of the living. Therefore the mothers are generally concealed in a leaf hut some distance from their homes in order to escape the notice of malevolent spirits. They may be kept in seclusion for as much as six months.

The food taboos often result in protein deficiency in the children and they have an adverse effect on the mothers' health and lactation.

Cicely D. Williams

Wilkinson, Gwendoline K., Day, A. J., Peters, J. A. & Casley-Smith, J. R. **Serum Proteins of Some Central and South Australian Aborigines.** *Med. J. Australia.* 1958, Aug. 2, v. 2, No. 5, 158–60, 1 fig.

"Serum protein determinations were carried out by paper electrophoresis on aborigines from Haast Bluff in Central Australia and from the Ernabella Mission in South Australia. The serum albumin level was low in the Ernabella group, but normal in the Haast Bluff group. The γ-globulin was considerably elevated in both groups. These findings are discussed in terms of the dietary intake of these peoples."

Rollier, R. & Rimbert, C. L. Pellagre et pellagroïde. A propos d'une flambée de pellagre au Maroc. [**Pellagra and Pellagroid. An Outbreak of Pellagra in Morocco**] *Maroc Méd.* 1958, Aug., v. 37, No. 399, 846–7.

SPRUE

Nilsson, L. R., Söderhjelm, L., Höglund, N. J. & Törnblom, N. Infantilism hos spruepatient utan tarmbesvär. [**Infantilism in Sprue without Gastro-Intestinal Symptoms**] *Nordisk Med.* 1958, Sept. 11, v. 60, No. 37, 1317–19, 2 figs. [18 refs.]

The English summary appended to the paper is as follows:—

"A case of sprue with infantilism in a youth aged 18 years is described. Remarkably enough, the patient was unaware of any gastro-intestinal symptoms.

"The diagnosis of sprue was based on the following findings: transient osteomalacia (Milkman's fracture) and pellagrous skin changes, megaloblastic anaemia which was corrected by administration of vitamin B_{12} and iron, steatorrhea, and flat oral glucose tolerance curves. While the patient had megaloblastic anaemia free hydrochlorid acid could not be demonstrated, but it was present when that condition had been corrected."

Kowlessar, O. D., Williams, R. C., Law, D. H. & Sleisenger, M. H. **Urinary Excretion of 5-Hydroxyindolacetic Acid in Diarrheal States, with special reference to Nontropical Sprue.** *New England J. of Med.* 1958, Aug. 14, v. 259, No. 7, 340–41, 1 fig. [14 refs.]

Frazer, A. C. **Fat Absorption and its Disorders.** *Brit. Med. Bull.* 1958, Sept., v. 14, No. 3, 212–20, 6 figs. [Numerous refs.]

HAEMATOLOGY

Brading, Ilse. **The Serum Protein Pattern in some Pacific Natives.** *Med. J. Australia.* 1958, July 12, v. 2, No. 2, 49–53, 3 figs. [16 refs.]

Serum protein was estimated and in many cases its fractions were determined by electrophoresis in some 800 coloured men and women from the Pacific area and in 150 white Australians. Serum was obtained

from clotted blood or from clotted plasma. The plasma was derived from blood to which solid citrate had been added and was somewhat diluted because of transfer of fluid from the red cells. The following extract from the author's tables illustrates that in some coloured populations the albumin was lower than in the Australian control group and that the gamma globulin was higher in most of them.

Protein Values in gm. per 100 ml. of clotted plasma

	Number	Albumin	Gamma globulin
White Australians			
Male	24	3·07	1·65
Female	14	2·68	1·59
New Guinea Highlands:			
Chimbu Male	46	3·02	2·28
Female	47	2·67	2·20
Wabag Male	81	2·80	2·06
Laiagam Male	26	2·61	1·79
New Guinea Lowlands:			
Moresby Male	135	3·12	2·17
Wewak Male	33	2·94	2·30
Bougainville			
Male	20	2·84	2·54
Female	24	2·90	2·50
Darwin Aborigines			
Male	8	3·13	1·86
Female	16	3·23	1·89
Korea			
Female	20	3·09	1·44
Philippine Islands	20	2·73	1·57
Solomon Islands	20	2·72	2·23

In some areas the author compared the fractions in different age-groups, but there was no uniform pattern. Thus in Chimbu a fall in albumin was seen in the 11–15 years age-group whereas there was a rise in Bougainville at that age. Several explanations are considered for the high gamma globulin seen in most coloured peoples, an observation which resembles those made in Africa and other tropical regions. Acute and chronic infection, parasitic infections, protein malnutrition, vegetable protein as the main source of amino acids, and racial constitution are considered, but none of these is accepted as the single cause of the high gamma globulin in all regions of the tropics where it has been observed.

H. Lehmann

Banerjee, B. **Haematological Values and their Variations amongst Residents of Assam.** *J. Indian Med. Ass.* 1958, July 16, v. 31, No. 2, 67–73, 5 figs. [13 refs.]

An attempt has been made to establish normal haematological values for residents of Assam. The paper comes from the Assam Medical College, and presumably the subjects "of age group 18–24" came from

the student body. 131 male and 75 female subjects were examined in winter and 63 male and 43 female subjects in summer. From this group 63 men and 25 women were examined both in summer and winter. In addition, 48 officers and 34 other ranks from the Indian Army and 45 skilled labourers, of age-group 25–40 years, were also examined.

The highest mean haemoglobin values were found in the officers and soldiers—15·1 and 15·9 gm.% respectively. The mean value in the labourers was 14·2 gm.% and in the male students (winter) 14·7 gm.%. The figure for the students was slightly lower in summer. The women had a mean haemoglobin level of 12·85 gm.% in summer and of 12·12 gm.% in winter. Thus the seasonal variation is not very impressive.

The red cell count, sedimentation rate, mean corpuscular values, and white cell count were all in the same range as considered normal in Europeans. *H. Lehmann*

Chatterjea, J. B. **Nutritional Macrocytic Anaemia in India.** *J. Indian Med. Ass.* 1958, July 1, v. 31, No. 1; 4–10, 4 figs. (3 on pl.) [41 refs.]

It is almost impossible to distinguish between pernicious anaemia and nutritional macrocytic anaemia on haematological grounds. Clinically the only absolute difference between the two is that neurological complications have never been seen in the nutritional anaemia of the tropics. It is therefore necessary to depend for diagnosis on the composite pattern rather than on any one single point. Pernicious anaemia occurs commonly in temperate climates and in white populations but is rare in the tropics and in non-whites. It affects even those living on an optimum diet. It is usually seen after the age of 40, and absolute achlorhydria is the rule in all phases. Neurological manifestations are usually present; folic acid may produce some improvement of the anaemia but it will not affect the neurological signs which may even worsen under folic acid therapy. Vitamin B12 therapy is essential.

Nutritional macrocytic anaemia is common in tropical and in subtropical countries and in non-white populations. It affects any age and is very often seen below the age of 30. Achlorhydria is rarely absolute, and when found may disappear after improvement of the blood picture. Many patients show no achlorhydria at all, and some may even be hyperchlorhydric. Vitamin B12 treatment is usually not necessary and some patients show a significant improvement on high protein diet. Crude liver extract or folic acid can cure the anaemia completely. Whereas in pernicious anaemia maintenance therapy is essential, this is usually not necessary in nutritional macrocytic anaemia.

This paper deals particularly with the role of vitamin B12, folic acid, and iron in nutritional macrocytic anaemia. The principal deficiency is that of folic acid, and an average daily dosage of 15–20 mgm. given for about one month will cure the majority of patients. There occurs

occasionally some deficiency in vitamin B12, and this is probably due to the degeneration of the intestinal mucosa (as evidenced by diarrhoea in some cases) or folic acid deficiency. At the beginning of folic acid therapy there occurs a drastic fall in serum iron, which is associated with the regeneration of the erythrocytes. *H. Lehmann*

Betke, K. Hämoglobinanomalien. [**Abnormal Haemoglobins**] *Schweiz. med. Woch.* 1958, Oct. 11, v. 88, No. 41, 1005–10, 1015, 12 figs. (6 on pl.) [Numerous refs.]

A general account and review of literature.

Marinone, G. & Bernasconi, C. Le diagnostic moderne de la thalassémie. Étude sur les altérations électrophorétiques de l'hémoglobine et sur leurs rapports, chez les porteurs de trait, avec la résistance des érythrocytes aux solutions hypotoniques. [**The Modern Diagnosis of Thalassaemia. Study of Electrophoretic Changes in Haemoglobin and their Relation to Erythrocyte Resistance to Hypotonic Solutions in Carriers of the Trait**] *Schweiz. med. Woch.* 1958, Oct. 11, v. 88, No. 41, 1010–12, 7 figs.

Ytrehus, K. Thalassemi ? [**Thalassaemia ?**] *Nordisk Med.* 1958, Sept. 11, v. 60, No. 37, 1321–3, 2 figs. [18 refs.]

The English summary appended to the paper is as follows:—

" A clinical picture in two siblings of Norwegian-German parentage is described. There was marked hypochromaemia without sideropenia. The red cells showed predominantly microcytosis and leptocytosis, and their osmotic resistance was increased. Their life-span was markedly reduced in one case, but it was not reduced at a subsequent control after the patient had been treated for thyreotoxicosis. Sternal puncture revealed profuse erythropoiesis. No abnormal haemoglobin constituents were found. Foetal haemoglobin was not demonstrated in pathological amounts.

" The daughter of one of the patients was found to have an anaemia that showed similar features. No abnormalities were found, however, in the blood picture of two brothers of the patients'. The possibility of the condition being thalassaemia minor is discussed."

André, R., Bessis, M., Dreyfus, B., Jacob, S. & Malassenet, R. Association d'un syndrome thalassémique et d'une hémoglobine anormale à l'électrophorèse, non encore identifiée, chez un Français d'origine picarde. Examen au microscope électronique. [**Association of a Thalassaemic Syndrome and an Unidentified Abnormal Haemoglobin in a French Subject from Picardy. Electron Microscope Studies**] *Rev. d'Hématologie.* 1958, Jan.–Mar., v. 13, No. 1, 31–46, 8 figs. [16 refs.]

De Traverse, P. M., Coquelet, M. L. & Brumpt, L. Présence, variations et signification d'une " hémoglobine lente " à pH = 9·2 chez le sujet normal et l'hétérozygote thalassémique. Electrophorèse sur papier. [**The Presence, the Variations and the Significance of a " Slow Haemoglobin " seen on Paper Electrophoresis at *p*H 9·2 in the Normal Subject and in the Thalassaemia Heterozygote**] *C.R. Soc. Biol.* 1958, v. 152, No. 1, 16–20, 3 figs. [15 refs.]

When studying the haemoglobin of Cambodians by paper electrophoresis at alkaline *p*H the authors noted that in some the amount of haemoglobin E was very small. This article recognizes that the pigment seen was in fact haemoglobin A_2.

Haemoglobin A_2 has the same electrophoretic properties as haemoglobin E, but although present in normal people the amount is usually too small for it to become apparent on paper electrophoresis. Starch electrophoresis uses larger quantities of haemoglobin and the A_2 fraction can be seen easily by this technique. In thalassaemia the proportion of haemoglobin A_2 is raised, and a haemoglobin-E-like component may then be noted even on paper electrophoresis. The fact that small haemoglobin fractions seen in the position of E on paper electrophoresis represent raised proportions of A_2 in thalassaemia clarifies some contradictions noted by the authors in previous work on the incidence of haemoglobin E in Cambodians. *H. Lehmann*

Gerald, P. S. & Diamond, L. K. **A New Hereditary Hemoglobinopathy (the Lepore Trait) and its Interaction with Thalassemia Trait.** *Blood.* 1958, Sept., v. 13, No. 9, 835–44, 4 figs. [13 refs.]

The mother of a child with clinical thalassaemia major was found to possess a hitherto unknown abnormal haemoglobin—named Lepore haemoglobin. The new pigment was present at a low concentration, about 12%, and it was not possible to demonstrate it on paper electrophoresis at alkaline *p*H. It could readily be seen on starch electrophoresis at alkaline *p*H, a technique which enables large quantities of haemoglobin to be analysed. On agar electrophoresis at *p*H 6·2 it migrated between haemoglobins A and F. The father's blood was indistinguishable from that of ordinary thalassaemia heterozygotes, and the child was subsequently considered to be doubly heterozygous for the new haemoglobin and for thalassaemia. Several carriers of the Lepore trait were observed in the mother's family, and the possession of the haemoglobin was always associated with a small amount of foetal haemoglobin and with a thalassaemic red cell morphology. *H. Lehmann*

Caminopetros, J., Papastamatiou, J. & Chlouverakis, C. **" False " Sickle Cells under the Polarising Microscope.** *Lancet.* 1958, Sept. 6, 507–8, 3 figs. [12 refs.]

The authors have produced enlongated cells resembling sickle cells by a prolonged incubation of normal blood. These cells were examined under the polarizing microscope and found to be birefringent. The conclusion is drawn that the alteration in cell shape represents true and not " false " sickling. [The article contains illustrations of conventional sickle cells and of others showing the " limited " sickling considered true by the authors. Some of the latter cells might well be mistaken for sickle cells but in most the difference between these smoothly elongated cells and the irregularly spiked conventional sickle cell is obvious. It is really a question of definition. If all cells containing haemoglobin tactoids are sickle cells then the authors have produced true sickling in cells containing no sickle-cell haemoglobin. If sickle cells are erythrocytes containing haemoglobin S then any doubt about whether a cell is a sickle-cell or not will have to be decided by an examination of the haemoglobin for the characteristic physical properties of sickle-cell haemoglobin.]

H. Lehmann

Hendrickse, R. G. **Diagnosis of Sickle-Cell Anaemia after Blood-Transfusion.** [Correspondence.] *Lancet.* 1958, Sept. 13, 586–7, 1 fig.

From time to time severely anaemic patients may be admitted to hospital, and transfused before the blood has been investigated for sickle-cell anaemia. In that case electrophoresis may show both haemoglobin S and A in a sickle-cell anaemia. [The amount of A would of course be relatively much less than one would expect to see in a carrier of the sickle-cell trait, but presumably the diagnosis of sickle-cell thalassaemia might then be possible.]

Normal red cells are completely, and sickle-cell anaemia erythrocytes only to a small extent, lysed at a saline concentration of 0·3%. Therefore by incubating the red cells of recently transfused sickle-cell anaemia patients with 0·3% saline it was possible to recover the original cells of the recipients and to demonstrate by electrophoresis that they contained only haemoglobin S.

H. Lehmann

Fraimow, W., Rodman, T., Close, H. P., Cathcart, R. & Purcell, May K. **The Oxyhemoglobin Dissociation Curve in Sickle Cell Anemia.** *Amer. J. Med. Sci.* 1958, Aug., v. 236, No. 2, 225–32, 4 figs. [22 refs.]

" Studies in 3 patients with sickle cell anemia confirmed the presence of significant arterial oxygen unsaturation. Studies in other parameters of pulmonary function testing failed to show impairment in pulmonary function sufficient to account for this arterial oxygen unsaturation. In

each patient there was a significant shift of the oxyhemoglobin dissociation curve to the right of normal, which was sufficient to explain the observed unsaturation."

[See this *Bulletin*, 1955, v. 52, 927.]

Mongan, E. S. **Coexisting Ovalocytosis and Hemoglobin C Trait.** *U.S. Armed Forces Med. J.* 1958, Sept., v. 9, No. 9, 1370–75, 2 figs.

"A case of coexisting ovalocytosis and hemoglobin C trait is reported. There was no laboratory or clinical evidence of increased red blood cell destruction. These two abnormalities evidently can be associated without a summation of effect."

[See this *Bulletin*, 1956, v. 53, 1045.]

Vella, F. **Haemoglobin D Trait in a Filipino Family.** *Med. J. Malaya.* 1958, June, v. 12, No. 4, 602–4.

Haemoglobin D is defined as a haemoglobin which has the same electrophoretic properties as haemoglobin S but differs from S by not causing the sickling phenomenon. In a recent survey in Singapore 6 instances of the trait were seen in 1,300 Indians, and 3 in 2,900 Malays. None was discovered in 2,600 Europeans, 4,700 Chinese and 560 Nepalese Gurkhas.

The present paper describes its presence as a symptomless trait in a Filipino woman, wife of a Chinese service man, and one of their two daughters. The article gives a complete review of the distribution of this haemoglobin as known up to the present. It is of interest that the patient with haemoglobin D, whose case was described by White and Beaven (*J. Clin. Path.*, 1954, v. 7, 175; this *Bulletin*, 1954, v. 51, (1286)), had some ancestors of Austrian and Spanish origin and that the propositus in the Filipino family was of Filipino-Spanish stock on her mother's side. [A recent paper by Benzer *et al.* (*Nature*, 1958, v. 182, 852) has shown that haemoglobin D samples from a Cypriot Turk, a Sikh, and a Gujerati respectively, though indistinguishable by electrophoretic methods, were in fact different in their amino-acid sequence.]

H. Lehmann

Benzer, S., Ingram, V. M. & Lehmann, H. **Three Varieties of Human Haemoglobin D.** *Nature.* 1958, Sept. 27, v. 182, 852–4, 3 figs. [20 refs.]

Haemoglobin D has been reported from many parts of the world, but the highest incidence known is in Indians (1 to 2%). Examples of

haemoglobin D from (a) a Turkish Cypriot, (b) a Gujerati Indian, (c) a Sikh, were digested and examined for their peptide content. Each proved to be distinct from the rest, and they were designated respectively Dα, Dβ and Dγ. In comparison with haemoglobin A, Dγ lacked a tyrosine-containing neutral peptide, while Dα and Dβ each lacked a different peptide in the arginine group, but contained a new neutral peptide. Two conclusions follow: (1) mutations have now been shown to occur in several parts of the haemoglobin molecule, (2) caution will have to be applied in any anthropological interpretation of the distribution of haemoglobin D, or of other haemoglobin variants which may be shown not to be homogeneous.

[It may be important to note that the third specimen came from an apparently homozygous DD person; if his 2 D genes were not identical the variant Dγ may be a mixture.] *Alan B. Raper*

Sanghvi, L. D., Sukumaran, P. K. & Lehmann, H. **Haemoglobin J Trait in Two Indian Women associated with Thalassaemia in One.** *Brit. Med. J.* 1958, Oct. 4, 828–30, 2 figs.

2 unrelated Indian women showed the haemoglobin-J trait. In one woman there was clear evidence that she had also inherited the thalassaemia trait, but she showed no more severe haematological changes than could be ascribed to the latter; this is evidence of the lack of any interaction between the two genetic effects. It is additional proof that the Hb-J trait has no pathogenic consequences.

[See also this *Bulletin*, 1957, v. 54, 1118.] *Alan B. Raper*

VENOMS AND ANTIVENENES

Radomski, J. L. & Deichmann, W. B. **The Relationship of Certain Enzymes in Cobra and Rattlesnake Venoms to the Mechanism of Action of these Venoms.** *Biochem. J.* 1958, Oct., v. 70, No. 2, 293–7, 3 figs.

"1. *Naja flava* (cobra) venom has been separated into two electrophoretically distinct fractions, one (fraction 1) four times as toxic as the other (fraction 2).

"2. Fraction 1 is composed of two highly mobile, strongly basic proteins comprising 80% by weight of the venom; fraction 2, which makes up the remaining 20% of the venom, consists of three proteins of low mobility. This fraction gives a positive Molisch test for carbohydrate.

"3. Fraction 1, which is four times as toxic as fraction 2, is much less potent than fraction 2 with respect to lecithinase A, adenosine triphosphatase, diphosphopyridine nucleotidase and ribonuclease activities, indicating that none of these enzyme activities is of prime importance toxicologically.

"4. Fraction 2 is also a much more potent inhibitor of succinic dehydrogenase than fraction 1. Thus although the lecithinase A activity may well be responsible for the inhibition of succinic dehydrogenase, neither action is of importance as a toxic mechanism.

"5. Comparison of the adenosine triphosphatase, diphosphopyridine nucleotidase and ribonuclease activities of *Naja flava* venom with those of two *Crotalus* venoms (*C. t. terrificus* and *C. adamanteus*) revealed that *Naja flava* venom was less active in each case."

Deichmann, W. B., Radomski, J. L., Farrell, J. J., MacDonald, W. E. & Keplinger, M. L. **Acute Toxicity and Treatment of Intoxications due to *Crotalus adamanteus* (Rattlesnake Venom).** *Amer. J. Med. Sci.* 1958, Aug., v. 236, No. 2, 204–7.

"1. The intramuscular injection of *Crotalus adamanteus* (rattlesnake venom) is followed by the immediate production of local and systemic effects. Local effects at or near the site of injection include: marked edema (and apparently marked pain), followed by rupture of the skin, digestion of the skeletal muscles, and necrosis. Systemic effects are confined to general lethargy, salivation, bloody diarrhea and death in coma.

"2. The acute toxicity (intramuscular) of the crystalline venom (20 to 25% of original weight) varies considerably for different species. The *Approximate Lethal Doses*, in mg. per kg. are as follows: dog, goat and rhesus monkey, 0·64 (2·8); rabbit 0·94 (4·1); pigeon and chick 1·4 (6·2); pig and guinea pig, 3·2 (14·0); mouse, 10·7 (47·0); and rat 25.0 (110·0). (Values in parentheses present lethal doses of original venom.)

"3. An average bite of a rattlesnake releases approximately 650 mg. of venom. This quantity is sufficient to kill approximately 4 young pigs, or 12 dogs, or 15 rats, or 23 young goats, or 27 rabbits, or 46 rhesus monkeys, or 54 guinea pigs, or 162 pigeons, or 216 chicks, or 325 mice.

"4. Hydrocortisone (Hydro-Cortef) injected intravenously into dogs 2 and 4 hours respectively, after an intramuscular injection of two *Approximate Lethal Doses* (1·28 mg. per kg.) of crystalline *Crotalus adamanteus* raised the number of surviving dogs from 17% (control) to 65 and 75%, respectively. Without the benefit of cortisone, dogs died in approximately 18 hours. Those that succumbed with cortisone survived for about 3 days. On the basis of these data, a dog given two *Approximate Lethal Doses* of venom and treated subsequently with Hydro-Cortef has a slightly better than even chance to survive.

"5. The administration of cortisone did not influence visibly the local

proteolytic or septic effects or healing. The beneficial action of cortisone is not understood at present."

Kohn, A. J. **Cone Shell Stings. Recent Cases of Human Injury due to Venomous Marine Snails of the Genus Conus.** *Hawaii Med. J.* 1958, July–Aug., v. 17, No. 6, 528–32, 1 fig. [10 refs.]

Marine snails of the genus *Conus* provide shells which are familiar objects on tropical beaches throughout the world, yet it is rarely appreciated that all known *Conus* species are predatory carnivores and that at least 6 of the larger species may injure and even kill man. These snails, which usually haunt coral formations, are of nocturnal habit, hiding by day in sand or crevices but emerging to move actively at night in search of their prey, which comprise annelid worms, other snails and even fish. Their venom is delivered through a detachable, dart-shaped tooth carried beneath the tip of the proboscis, to which the poison flows from a long, paired, duct-like gland. The venom appears to exert a neurotoxic action, but its composition is still unknown. Different species vary in venomousness, this being in general related to size. Of the species reported to have caused symptoms in man, *C. geographus*, which attains a length of 6 inches, appears to be the most dangerous, *C. textile* comes next, while *C. tulipa*, *C. aulicus* and *C. striatus*, which do not exceed 3 inches, are not known to have caused human fatalities. In all, 25 instances of *Conus* stings in human beings have been reported, of which 5 proved fatal. Case reports have come from the Seychelles, the Moluccas, New Guinea, Hawaii, Fiji, the Marshall and Marianne islands, and from Australia,

The site of injection is marked by a small black puncture, surrounded by a cyanotic area beneath which slight local swelling quickly develops. At this site, there is felt a stinging sensation of variable intensity, which may become intolerably painful. Paraesthesia and numbness may spread from the puncture site over the whole body, becoming most intense about the lips and mouth. Paresis may follow, though not invariably. In its most severe form a complete flaccid paralysis may develop, involving the muscles of deglutition and respiration. As an example of this most dangerous complication the author cites the case of a girl aged 8 whose life was with difficulty saved by artificial respiration followed by continuous positive pressure respiration through an endotracheal tube. Less severely affected patients may show systemic disturbances of some 24 hours' duration, characterized by headache, vomiting and intestinal colic. Dysarthria, diplopia and motor incoordination may occur as early, and limited signs of nervous involvement.

[Snails of this genus clearly provide a hazard for those collecting molluscs in tropical and subtropical waters of the Pacific and Indian oceans. This is a fascinating and beautifully illustrated article.]

J. H. Walters

HINEGARDNER, R. T. **The Venom Apparatus of the Cone Shell.** *Hawaii Med. J.* 1958, July–Aug., v. 17, No. 6, 533–6, 6 figs.

"The venom apparatus consists of these parts: A muscular bulb, which is attached to a long, convoluted venom duct, in which the venom is secreted; a radula sheath where the radula teeth are produced and stored; a muscular pharynx, and an extensible proboscis. A salivary gland attaches to the radula sheath."

TOXOPLASMOSIS

FELDMAN, H. A. **Toxoplasmosis.** *Pediatrics.* Springfield, Ill. 1958, Sept., v. 22, No. 3, 559–74. [80 refs.]

COOK, M. Katherine. **The Inhibitory Effect of Adenine and Related Compounds on the Proliferation of *Toxoplasma gondii* in Tissue Culture.** *J. Parasitology.* 1958, June, v. 44, No. 3, 274–9.

The author has previously found that adenine delays degeneration of monkey kidney epithelial cells infected with *Toxoplasma gondii* even when given late in the infection. The present investigation deals with attempts to determine the rationale of this activity. The tissue cultures used contained monkey kidney tissue in Hanks solution and, later on, in Earle's balanced salt solution. The RH strain of toxoplasma was used, suspensions of the parasite being obtained from mouse peritoneal exudate.

Sterile adenine solution was added to the cultures and left for 5 days. The cultures were then washed 3 times with maintenance medium in which they were resuspended and the state of the tissue cells was noted daily in presence of growing *Toxoplasma*. Adenine was tested in concentrations varying from 0·01 to 16·0 mgm.% but the delay in lysis of tissue cells was not proportional throughout to the drug concentration used. The effect of adenine on host cell division and on the numbers of parasites was also studied. Mitotic division in the monkey kidney cells was inhibited and the number of parasite foci was fewer than in controls. Two known antagonists of adenine, namely benzimidazole and 2·6-diaminopurine, did not prevent the activity of adenine in the cultures. It was further shown that adenine in tissue culture does not exercise a direct toxic effect although the parasites failed to divide at normal rates, and it fails to affect non-proliferating parasites.

The nucleoside adenosine, certain nucleotides and xanthine acted in the same way as adenine.

J. D. Fulton

Cook, M. Katherine & Jacobs, L. *In vitro* **Investigations on the Action of Pyrimethamine against** *Toxoplasma gondii*. *J. Parasitology*. 1958, June, v. 44, No. 3, 280–88, 2 figs. [13 refs.]

The activity of pyrimethamine (Daraprim) against toxoplasmosis in mice is well recognized [this *Bulletin*, 1953, v. 50, 158; 1957, v. 54, 1239]. The effect of this substance on *Toxoplasma* growing in tissue culture has now been studied, and also its mode of action. Mouse mince cultures were infected with toxoplasms and treated with the drug in different concentrations in fluid medium for 7 days, and a suspension of culture material was then used to inoculate mice for determining the presence of viable parasites. Untreated cultures were washed and reincubated and the effect of the lactic acid used to dissolve the pyrimethamine was also investigated in the absence of drug.

It was found that 0·1 mgm.% pyrimethamine inhibited proliferation of parasites. For complete destruction of parasites 0·3 to 0·4 mgm.% appeared to be the minimal dose. Similar experiments were performed with the drug in monkey tissue cultures of *Toxoplasma*, and it was found that much less drug was in general required to kill parasites than in the mouse tissue cultures. It appeared that pyrimethamine acted by interfering with multiplication of the parasites even when the drug was given 48 hours after inoculation of cultures in concentrations as low as 0·05 mgm.%. The authors' data indicate that pyrimethamine does not act against non-proliferating *Toxoplasma*. Penetration of host cells by parasites was not impeded by the drug and the age of the culture did not affect the ability of the drug to kill parasites. The synergic action of pyrimethamine and sulphadiazine in toxoplasmosis of mice reported by Eyles and Coleman [*ibid.*, 1953, v. 50, 980] has also been shown to occur *in vitro*. *J. D. Fulton*

Van Thiel, P. H. Das Problem der Spezifizität des Sabin-Feldman Farbtestes. [**The Problem of the Specificity of the Sabin-Feldman Dye Test**] *Antonie van Leeuwenhoek: J. Microbiol. & Serol.* 1958, v. 24, No. 2, 113–33, 13 figs. [27 refs.]

In this paper are discussed the technique of the dye test for toxoplasmosis, the significance of low titres and the specificity of the test. The interfering action of properdin is also considered. It is concluded that there is no worth-while evidence that the Sabin-Feldman dye test is not specific for toxoplasmosis. *I. A. B. Cathie*

TROPICAL OPHTHALMOLOGY

De Freitas, C. A. Tracoma. Epidemiologia e profilaxia. [**Epidemiology and Prophylaxis of Trachoma**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Apr., v. 9, No. 2, 251–70, 2 figs. [20 refs.] English summary.

This paper, by the Co-ordinator of the campaign against trachoma of the National Department of Rural Endemic diseases in Brazil, contains a useful survey of the epidemiology and prevention of trachoma, with special reference to Brazil.

This ubiquitous disease occurs wherever overcrowding and low standards of living prevail. In a brief survey of world incidence, illustrated with a map, the author notes that the estimated incidence throughout the 5 continents is more than 200 million cases, with the worst foci in Asia and North Africa where, in some areas, prevalence may reach 80 to 90% of the population. In Brazil there are three original foci, namely in the north-east, in São Paulo and in Rio Grande do Sul; from these primitive foci the disease has spread and a survey of some 800,000 persons in 303 towns in Brazil in 1943–1956 revealed the presence of 22 secondary foci, which are listed and shown on a map. The affected area covers more than 1 million square kilometres, with a population of 12·5 million persons at risk: it is estimated that 1 million of these are infected. Prevalence is greatest in rural areas, where the incidence may be more than 50%, and in some foci reaches as much as 80–90%.

The best methods of determining incidence are (1) examination of schoolchildren who represent a good sample of prevalence in the family, in which dissemination largely occurs, (2) examination of military recruits, (3) analysis of the percentage of cases seen in eye-clinics.

The author reviews the aetiology of trachoma and the properties of the virus, transmission, distribution in population groups, sex, race, occupation and environmental conditions. Climate as such does not limit incidence, but a high temperature and humidity have an indirect effect in bringing about an increase in the number of cases.

The influence of migration is discussed. The origin of the 3 primitive foci in Brazil can be traced to the influx of immigrants from Portugal (especially gypsies), the Mediterranean countries and Asia, from the 18th century onwards. From there the disease spread to the secondary foci through the medium of internal migration. An example is given of the group of workers who came from north-east Brazil in 1956 to work on a hydro-electric project in Minas Gerais: 62·9% of them were found to be carriers of trachoma.

Prophylaxis and its difficulties are discussed at length. Trachoma cannot be controlled as rapidly as insect-borne diseases; isolation is not practical in a disease with an insidious onset and a more or less chronic course; no method of immunization has been evolved. Prevention rests

on 2 bases: mass treatment and education in hygiene. The various practical aspects of prevention are discussed fully under the headings of international, school, industrial, military, clinic and rural prophylaxis, with special emphasis on the last named, where the campaign is carried out by trained teams under the supervision of physicians.

H. J. O'D. Burke-Gaffney

Collier, L. H. & Sowa, J. **Isolation of Trachoma Virus in Embryonate Eggs.** *Lancet.* 1958, May 10, 993–6, 3 figs. [13 refs.]

The authors have confirmed the claims of T'ang *et al.* [this *Bulletin*, 1958, v. 55, 96] to have isolated trachoma virus in fertile eggs. Conjunctival swabs taken from patients suffering from trachoma in West Africa were immersed in saline containing streptomycin and the material was inoculated into the yolk sac of fertile eggs at the second, fifth or sixth day of incubation. Strains of virus were isolated from 10 patients, and 1 strain was maintained through 10 passages. Smears from infected yolk sacs showed the presence of numerous elementary bodies, and in electron micrographs these had the typical morphology of members of the Chlamydozoaceae. In cross-fixation tests a close relationship between the West African and Chinese strains and psittacosis-lymphogranuloma group antigen could be demonstrated. A condition resembling trachoma with typical Halberstaedter-Prowazek bodies developed in a volunteer infected with a yolk-sac culture of one of the West African strains. *D. J. Bauer*

NOTE

In the abstract of the paper by d'Haussy, Rit and Lagraulet on lesions of the fundus of the eye in onchocerciasis, published in this *Bulletin*, 1958, v. 55, 1048, the first sentence of the second paragraph should be amended to read:

> "The authors state that the evidence leads them to believe, in the present state of our knowledge, that onchocerciasis is the cause of the lesions. [In the abstracter's opinion, there was little evidence to associate these conditions with onchocerciasis itself in the cases recorded.]"

HEAT STROKE AND ALLIED CONDITIONS

MEDICAL RESEARCH COUNCIL. **A Classification of Heat Illness. A Memorandum prepared for the Climatic Physiology Committee of the Medical Research Council.** *Brit. Med. J.* 1958, June 28, 1533–5. [12 refs.]

A new classification of heat illness has been prepared for the Climatic Physiology Committee of the Medical Research Council and agreed with representatives of the Forces, the Registrar-General's Department and Council of the Royal Society of Tropical Medicine (see Table below).

This represents a compromise, *e.g.*, heat cramps have been retained, although on aetiological grounds there was no difference between this condition and salt-deficiency heat exhaustion. Heat hyperpyrexia is defined as body temperature 106°F. (41°C.) or higher without the characteristic features of heat stroke.

A short description of the 14 disorders is given in an appendix.

Title	I.S.C. No.*		Modified No. (for Processing but not for Publication of Statistics)
Heat stroke (Following anhidrosis, / Heat hyperpyrexia: febrile illness, or unqualified)	N 981.0 / N 981.5a		N 981.0
Heat cramps	N 981.2		N 981.2
Heat exhaustion:			
1. Anhidrotic	N 981.3a	N 981.3	N 981.6
2. Salt deficiency (excluding heat cramps)	N 981.3b		N 981.7
3. Unqualified (including water-deficiency heat exhaustion, exercise-induced heat exhaustion, and heat syncope)	N 981.3c		N 981.3
Sunburn	N 981.4		N 981.4
Prickly heat	714.0a		N 981.8
Anhidrosis	714.0b		N 981.9
Heat neurotic reactions (including chronic heat neurotic reaction, chronic heat fatigue, mild asthenic reaction, mild heat fatigue)	318.3a		318.3 (part)
Other heat effects (including heat oedema)	N 981.5b		N 981.5

* *Manual of International Statistical Classification of Diseases, Injuries and Causes of Death* (1957, WHO, Geneva).

M. L. Thomson

MISCELLANEOUS DISEASES

Martin, M. & Guillaume, P. Malignité en pathologie exotique. [**Malignant Attacks in Tropical Diseases**] *Méd. Trop.* Marseilles. 1958, July–Aug., v. 18, No. 4, 611–19.

This article deals with malignant attacks causing coma and rapid death in the tropics. In this category the authors include malignant malaria, typhus (exanthematic and murine), cholera and bacillary dysentery.

The arguments employed are purely theoretical and include the effects of climate on the clinical and pathological conditions.

Philip Manson-Bahr

Sankale, M., Le Viguelloux, J., Rivoalen, A. & Milhade, J. La place des zoonoses dans la pathologie du Soudan français. [**Zoonosis in Relation to Human Disease in the French Sudan**] *Bull. Soc. Path. Exot.* 1958, Mar.–Apr., v. 51, No. 2, 203–8. [13 refs.]

The French Sudan has a large livestock population including a turnover of 6 million sheep and goats and 3 million head of cattle; these animals live in contact on the one hand with man and on the other with wild animals, and infections are thus liable to pass from one group to another. The following zoonoses occur.

Virus affections: Rabies is present particularly in Bamako; there are 2 to 4 human cases a year and the dog is the principal reservoir. About 30 cases of encephalitis are seen each year: the aetiology is unknown but they are probably arthropod-borne and with an animal reservoir. Cases of ornithosis probably occur.

Rickettsial infections: "Neo-rickettsial" infections are fairly common in sporadic or epidemic form and are thought to have a reservoir in the livestock. Q fever exists in man and originates in the sheep and goats. Murine typhus is also present.

Bacterial infections: Anthrax is well known and is widespread in the territory. 16% of milk samples gave a positive reaction for *Brucella*, while brucellosis occurs in man either sporadically or in small epidemics (*Br. melitensis*). Tuberculosis is common in man and cattle.

Parasitic infections: Cutaneous leishmaniasis occurs and 200–400 human cases are reported yearly. The animal reservoir is unknown. *Echinococcus* is widespread in animals but rare in man. *Taenia* [*saginata*] is common in cattle and in certain human tribes, particularly the Moors.

Mycoses: 2 cases of histoplasmosis have been observed, which possibly had an animal origin.

P. C. C. Garnham

Nguyen-Van-Ai, Phan-Ngoc-Duong & Nguyen-Tri-Loc. Deux cas de rhinosporidiose chez des Viet-namiens. [**Two Cases of Rhinosporidiosis in Vietnamese**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 314–15, 5 figs. on 2 pls.

Lapeyssonnie, L. Mise au point: bacille de Whitmore et mélioïdoses. [**Whitmore Bacillus and Melioidosis, a Survey**] *Ann. Inst. Pasteur.* 1958, Sept., v. 95, No. 3, 334–42. [30 refs.]

The English summary appended to the paper is as follows:—

"*Bacillus whitmori* (*Malleomyces pseudomallei*) has been found almost simultaneously in human beings and in rats in the Far East. In the last forty years, its pathological range has become much broader (different suppurations, acute septicemic forms, pulmonary, pleural, nervous, hepatic localizations), and the number of cases has increased. This is due to the facts that the disease is now better known clinically, and that laboratory methods (isolation of strains, sero-agglutination, hemagglutination, complement fixation reaction) are now commonly used.

"From the epidemiological viewpoint, it is now proved that *M. pseudomallei* normally exists in sludges and stagnant waters, which represent the main source of the virus in Vietnam. It has been found in these sludges and waters either directly or indirectly by the demonstration of anti-Whitmore bacteriophages.

"Furthermore, the recent findings show that the Whitmore bacillus is a well characterized germ, and not a mutant of other species.

"The present geographical distribution of the germ, which is till now limited to the Far East, will probably extend much farther."

Pizzolato, P. **Follow-Up Study of a Patient with Melioidosis.** [Correspondence.] *Amer. J. Clin. Path.* 1958, Sept., v. 30, No. 3, 256.

This paper describes the treatment up to February 1958 of a patient from whose rib *Pfeifferella whitmori* was isolated in December 1953 [this *Bulletin*, 1955, v. 52, 406]. At first he received Achromycin [tetracycline], aureomycin and Gantrisin [sulphafurazole] for 10 days with improvement. A purulent mass in the left ilium was shown to contain *Pf. whitmori*. Thereafter, the drugs were discontinued from time to time owing to side-effects. Chloramphenicol was given from March 1954 for periods of several months at a time but was stopped on three separate occasions because of visual disturbances: apart from this the patient improved progressively. However, in December 1954 chloramphenicol was given once more until September 1955, when the eye symptoms had returned and bilateral macular degeneration was diagnosed. By this time the patient had received more than 1600 gm. of chloramphenicol. In the middle of September 1955 he was given corticotrophin and vision improved greatly; this hormone was discontinued in October. In March 1956, the patient developed bronchial asthma and pyrexia, which were treated with tetracycline and sulphafurazole: the tetracycline was stopped after 6 weeks, because of side-effects. In April 1957 he developed dyspnoea, productive cough and pleuritic pain and *Pf. whitmori* was isolated from the sputum: its cultural characteristics were essentially the

same as those of the organism isolated in 1953 and it was equally pathogenic to guineapigs. It was sensitive to 10 μgm. of oxytetracycline, chloramphenicol, tetracycline and Albamycin and to 1 mgm. of sulphadiazine. The patient was given tetracycline and sulphadiazine: he improved rapidly, gained weight and his sputum diminished and became free of *Pf. whitmori*. He remained on this treatment and was in good health when last seen. At that time the complement-fixation tests for melioidosis and glanders were positive respectively at 1 in 40 and 1 in 4.

H. J. O'D. Burke-Gaffney

Le Gac, P., Giroud, P. & Bablet, J. En Oubangui-Chari, il existe des hépatonéphrites toxi-infectieuses mortelles non amariles. [**A Fatal Infectious Hepatonephritis in Ubangui-Chari, not due to Yellow Fever**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 309–13, 1 fig. on pl. & 1 chart.

Although the population of Ubangui-Chari is substantially protected against yellow fever, a closely similar clinical syndrome still occurs, unaccompanied by the histological features of yellow fever. Five cases in protected Europeans are described, four of them fatal. In one of these the illness took the form of recurrent attacks, and death occurred after 140 days; blood from this subject was lethal to guineapigs and mice, and in a chimpanzee caused a prolonged fever during which no antibodies to yellow fever developed. In smears from the cerebral cortex of the human cases there were observed granules in the capillary walls, singly and in masses, which stained deep violet with Giemsa and ruby-red with Marchiavello's stain. All the affected subjects seemed to have contracted the disease in the swampy regions of Ubangui, and it is supposed that the vectors are confined to such situations. *Alan B. Raper*

McFadzean, A. J. S. & Tsang, K. C. **Chronic Leg Ulcers in Cryptogenetic Splenomegaly.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, July, v. 52, No. 4, 354–62, 5 figs. [23 refs.]

The authors have noted in Hong Kong a significant association of pigmentation and ulceration of the legs with "cryptogenetic splenomegaly". The latter condition is enlargement of the spleen associated with a varying degree of liver damage, giving rise to pancytopenia which is relieved by splenectomy.

The skin lesion is usually initiated by slight trauma—even an insect bite will suffice—around the site of which a dusky red zone of inflammation develops. The affected area is tender, aches and may itch intolerably, while small vesicles develop within its boundaries. The lesion extends irregularly in a proximal direction and tends to encircle the limb. The older areas assume a dark, leaden hue, which becomes permanent. Multiple pigmented areas, rather than a single large one, may be

encountered; the largest lesions cover a skin area over the anterior, medial and lateral aspects of the leg which may extend from the tibial tuberosity to the dorsum of the foot. Ulceration usually occurs, and assumes one of two forms. The first is a small, clear-cut, punched-out ulcer surrounded by a zone of deeper pigmentation which heals to leave a papery, atrophic scar. The second variety spreads rapidly to involve the whole area of pigmentation; this shows little tendency to heal and may persist for as long as 12 years.

Histological examination of biopsy material taken from the pigmented lesion reveals a striking degree of vascular dilatation in the dermis together with an accumulation of macrophages heavily loaded with iron. Although there is a variable increase in melanin deposition, it is the aggregation of iron-laden macrophages which impart the characteristic colour.

Among 286 patients suffering from cryptogenetic splenomegaly, the incidence of this skin lesion was 34% in males and 9% in females. The degree of liver damage as assessed by biopsy did not appear to influence its development. Splenectomy was remarkably beneficial, all ulcers healing promptly and soundly; among 86 patients so treated no recurrence has been seen up to 7 years after operation.

The authors consider the lesion to be an intense necrotizing inflammatory reaction due to bacterial allergy, which is in some way associated with hypersplenism. They have demonstrated an exaggerated local response to intradermal injections of tuberculin in all their patients, and this has subsided after splenectomy in each patient upon whom this operation has been performed.

Reviewing all the conditions in which leg ulceration is associated with splenomegaly, the authors feel that there must be a single mechanism common to many of them. They cite Felty's syndrome and Gaucher's disease as conditions in which a mechanism similar to that postulated in their examples of cryptogenetic splenomegaly may operate. The ulceration of sickle-cell anaemia, on the other hand, is not comparable, being due to primary capillary occlusion.

[This is a fascinating study, but the causative mechanism would appear to require further investigation.] *J. H. Walters*

VANDEPUTTE, M. L'athérosclérose coronaire chez les Congolais: Étude anatomo-pathologique. [**Coronary Atherosclerosis in Congo Africans; Pathological Study**] *Ann. Soc. Belge de Méd. Trop.* 1958, Apr. 30, v. 38, No. 2, 211–17.

The English summary appended to the paper is as follows:—

" (1) The atherosclerotic lesions seem to be found as early in Congolese as in White people.

" (2) The severe forms of atherosclerosis with necrosis, calcification and

partial or complete obliteration of the coronary arteries are rarer and appear also much later.

" (3) The histological examination of the lesions shows no great qualitative differences between the two races."

Sankale, M., Rivoalen, A. & Milhade, J. Les cardiopathies en milieu africain au Soudan français. [**Cardiopathy in Africans in the French Sudan**] *Méd. Trop.* Marseilles. 1958, July–Aug., v. 18, No. 4, 620–37. [16 refs.]

The myocardium in the African is the target for nearly all visceral affections, especially infectious and parasitic diseases, nutritional states and the anaemias. The aetiological factors are therefore very numerous and often intricate. More than half the patients arrive for consultation in the stage of decompensation.

The pathology of endocarditis is better understood when it is realized how small a part is played by rheumatic fever in this condition. The myocardium, like the liver, is very sensitive in Africans. Pericardial affections are nearly always tuberculous. Coronary thrombosis is reported in 4 instances, but myocardial infarction is exceptional, though arteriosclerosis is common. 9 cases with congenital deformities are described in Dakar. Cardiac surgery has now been introduced with encouraging results so far. *Philip Manson-Bahr*

Benson, R. P. **Primary Carcinoma of the Liver in Infancy: with a Case Report of a Coloured Infant.** *South African Med. J.* 1958, Aug. 23, v. 32, No. 34, 845–9, 3 figs. [37 refs.]

Follis, R. H., Jr. & Tousimis, A. J. **Experimental Lathyrism in the Rat. Nature of Defect in Epiphysial Cartilage.** *Proc. Soc. Exper. Biol. & Med.* 1958, Aug.–Sept., v. 98, No. 4, 843–8, 2 figs. [10 refs.]

Kalliomäki, L.; Yli-Pohja, M.; Kulonen, E. **Tissues in Experimental Lathyrism. I. Polysaccharides, Sodium, Potassium, Phosphorus and Creatine** [Kalliomäki, Yli-Pohja & Kulonen]. *Ann. Med. Exper. et Biol. Fenniae.* Helsinki. 1958, v. 36, No. 2, 145–7. [10 refs.] **II. Amino Acids and Absorption Spectrum of Muscle Extract** [Yli-Pohja, Kalliomäki & Kulonen]. *Ibid.*, 148–52, 3 figs.

" I. The lathyritic rats did not differ from the controls in the amounts of bone or skin polysaccharides nor in muscle sodium, potassium, phosphorus or creatine."

"II. The non-hydrolyzed muscle extract of the normal rat contained a ninhydrin positive substance, which was absent from the muscles of lathyritic rats. This substance yielded in hydrolysis at least glycine and glutamic acid.

"The ultraviolet absorption spectrum of the muscle extracts from lathyritic rats differed significantly from the respective controls."

PARASITOLOGY: GENERAL

American Society of Parasitologists. **Program and Abstracts of the Thirty-Third Annual Meeting of the American Society of Parasitologists, Bloomington, Indiana, August 24–27, 1958.** *J. Parasitology.* 1958, Aug., v. 44, No. 4, Sect. 2 (Suppl.), 48 pp.

This section of the *Journal* follows on the lines of its predecessors [this *Bulletin*, 1958, v. 55, 221].

The present issue contains abstracts of 107 papers. Those of special interest to readers of this *Bulletin* include the following subjects (with the number of abstracts in brackets): *Plasmodium* (2), *Trypanosoma* (1), *Entamoeba* (3), *Trichomonas* (1), *Schistosoma* (5), *Paragonimus* (2), *Hymenolepis* (4), *Dracunculus* (1), *Trichinella* (7), *Thelazia* (1), *Culex* (1), *Ornithonyssus* (1).

The Presidential Address "Some Parasites and their Chromosomes" was given by Arthur C. Walton of Knox College, Galesburg, Illinois.

H. J. O'D. Burke-Gaffney

Zangaglia, O. & Cambieri, F. Richerche sulla diffusione delle parassitosi intestinali in provincia di Pavia. [**Studies on Intestinal Parasitism in the Province of Pavia, Italy**] *Riv. Istituto Sieroterap. Ital.* 1958, July–Aug., v. 33, No. 4, 274–81, 1 fig. [17 refs.]

The English summary appended to the paper is as follows:—

"Presence of intestinal parasites in human stool samples was investigated in 924 individuals in Pavia country.

"Among helminthic infections, *Trichocephalus* [*Trichuris*] infection was the most frequent (29·2%), while cases of ankylostomiasis, ascariasis and taeniasis were rather rare (0·3%).

"Among protozoan infections *Entamoeba coli* and *Endolimax nana* were equally diffused (12·3–11·5%).

"Giardiasis was observed in 4·2% patients, prevalently in males.

"All parasitic infections were more frequent in rural areas."

Sinnecker, H. Zur epidemiologischen Bedeutung städtischer Abwässer bei der Verbreitung von zooparasitären Infektionsmöglichkeiten. [**The Importance of Municipal Sewages in the Transmission of Zooparasitic Infection**] *Ztschr. f.d.g. Hyg. u. ihre Grenzgebiete.* Berlin. 1958, Jan.–Feb.–Mar.–Apr., v. 4, Nos. 1/2, 98–115. [Numerous refs.]

This is a long and detailed paper in which, with very many references and description of investigations, the possible dangers of crude and treated sewage to human and animal health by the transmission of zooparasites are surveyed and assessed. The results of particular investigations during 1954 to 1956 in Halle, Frankfurt, Rudolstadt and the districts of Cottbus and Görlitz are recorded together with a description of the methods of examination which were adopted. There is a long summary to the paper. Some of the conclusions are: —

(1) the zooparasites found in sewage which are important to human health are: — *Giardia intestinalis*, *Entamoeba histolytica*, *Taenia saginata*, *Echinococcus granulosus*, *Ascaris lumbricoides* and *Trichuris trichiura*, (2) ova of *A. lumbricoides*, *Taenia* or *Echinococcus* spp. and *T. trichiura* were found in sewage and survived partial purification, (3) by animal experiments it was shown that ova of *A. lumbricoides suis* survived in fields irrigated with sewage, (4) in an investigation of sewage and irrigation workers it was found that the percentages of infection were 14% and 9% respectively with *E. histolytica*, 2% and 16% with *A. lumbricoides* and 5% and 11% with *T. trichiura* and (5) it was found that in 40% of cattle found to have a helminthic infection the origin of this was exposure to sewage. In Cottbus among 180 owners of these infected animals and dependents of these owners it was found that 1·6% were infected with *T. saginata*. *M. E. Delafield*

Maegraith, B., Gilles, H. M. & Devakul, K. **Pathological Processes in *Babesia canis* Infections.** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, No. 4, 485–514, 7 figs. [Numerous refs.]

The physiological and pathological changes in young dogs during acute infections with *Babesia canis* have been investigated and are discussed with reference to similar processes in malaria. Infection in dogs and puppies (60 in all) was produced by intraperitoneal or intravenous injection of infected blood. In puppies death occurs in a few days with signs of acute respiratory failure or shock accompanied by many other pathological signs. The course of infection was followed in stained films. The severity of the infection was not always correlated with the degree of parasitaemia. In puppies anaemia accompanied by haemoglobinaemia and haemoglobinuria was a notable feature, and was normally accompanied by a rise in reticulocyte count. The mechanical destruction of red cells by parasites was unable to account for the severe anaemia, and uninvaded

cells were also affected. There was apparently no alteration in the saline fragility test but an increase in mechanical fragility was observed, also when in contact with the plasma of infected animals late in the infection. The sedimentation rate was increased. Haemosiderin could be observed in parasites or tissue spaces but other pigments were absent.

Homologous red cells tagged with ^{32}P or ^{59}Fe were not lysed preferentially in the infected animal when introduced intravenously. The dissociation curves of oxyhaemoglobin at different stages of infection did not deviate from normal, and oxygen is probably carried unimpeded to the tissues. Nevertheless, damage as the result of anoxia occurs in the centrilobular regions of the liver. It was believed that methaemoglobin seen in the urine of haemoglobinuric dogs was formed in the kidney. The sodium, potassium and chloride content of plasma was not disturbed during infection. Estimation of total protein, globulin and albumin in plasma did not reveal any unexpected changes. Blood sugar values remained remarkably constant during infection but liver glycogen was reduced during severe infections and there was a rise in urea nitrogen. The oxygen uptake by the parasites was small and it did not seem that they would compete seriously with the tissues for oxygen. Histological and functional changes in the liver, kidney, spleen, heart, adrenals, lungs and brain are described. There appeared to be little or no specific development of parasites in visceral sites. Loss of red blood cells due to phagocytosis and lytic mechanisms occurred simultaneously with marked erythropoiesis in bone marrow. Reduction in blood volume was observed in severe cases.

Some of the physiological and pathological findings during malaria infection in animals resemble those in *B. canis* infections of dogs. Death in the latter may occur from respiratory or circulatory failure.

J. D. Fulton

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Martins, C. M., Ferreira Neto, J. A. & Leal, H. Dispositivo prático para a captura de mosquitos a serem submetidos à prova de Busvine e Nash (susceptibilidade aos inseticidas). [**Practical Method for Capturing Mosquitoes for the Busvine-Nash Test for Susceptibility to Insecticides**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Apr., v. 9, No. 2, 213–15, 1 fig. English summary.

A description, with figures, is given of a simple means of transferring mosquitoes from a tube, or cylinder, with gauze at both ends into a second tube, one end of which is closed. The second tube is of sufficiently narrower bore to slide easily within the cylinder. One gauze of the

cylinder is removed as the open end of the second container is applied to it. The second container is then gently slid through the cylinder until it protrudes at the other end, the gauze of which may now be used to confine the mosquito in the second container, into which it has been transferred during this process. Less damage is suffered by the insect, it is claimed, than by other means of transfer from one container to another and only a few seconds are required for transfer. The method was developed for the transfer of mosquitoes to the exposure cylinders in the standard kit issued by WHO for testing the susceptibility of mosquitoes to insecticides. *D. S. Bertram*

Graham, J. E., Rees, D. M. & Nielsen, L. T. **Trends in Mosquito Populations in Salt Lake County.** *Mosquito News.* 1958, June, v. 18, No. 2, 98–100. [12 refs.]

The results of a mosquito survey in Salt Lake County, Utah, U.S.A., are compared with the results obtained in earlier surveys made between 1930 and 1932. Permanent control measures are used in the area, and some species, such as *Anopheles freeborni* and *Aëdes vexans*, have been reduced in numbers. In contrast, populations of other species, such as *Culex pipiens* and *Aëdes nigromaculis*, appear to have increased. The reasons for the increase in numbers of some of the species have not been determined, but it is suggested that more breeding sites containing polluted water are now available for *C. pipiens*. Chemical control measures have reduced, but not eliminated, the adult populations, and the only permanently effective method of reducing the mosquito populations has been by elimination of the breeding places. *B. R. Laurence*

Rachou, R. G., Moura Lima, M., Ferreira Neto, J. A. & Martins, C .M. Avaliação da domesticidade do *Culex pipiens fatigans*, em Florianópolis (Santa Catarina), por meio de capturas intra e extradomiciliárias realizadas concomitantemente. [**Study of Domestic Habits of** *Culex pipiens fatigans* **in Florianópolis, Santa Catarina, Brazil, by Captures Inside and Outside Houses Concurrently**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1957, Jan., v. 9, No. 1, 77–8, 1 fig.

The English summary appended to the paper is as follows:—

"In 151 simultaneous captures (6.00–8.00 p.m.) inside homes and with human and animal (horse) baits outside and near the houses, the authors got 1,109 female specimens of *Culex pipiens fatigans* and 227 female specimens of *Aëdes scapularis*, with the following distribution:

"These figures speak of a high domesticity of *Culex pipiens fatigans.*"

	fatigans	*scapularis*
indoors	81·1%	8·4%
outdoors: human bait	1·2%	25·6%
outdoors: animal bait	12·7%	66·1%

Rozeboom, L. E. & Twohy, D. W. **Comparison of Nutritive Reserves in Males of Autogenous and Anautogenous Populations of *Culex pipiens*.** *J. Parasitology.* 1958, Aug., v. 44, No. 4, 422–4.

"Comparison in male *C. pipiens* and *molestus* of total dry weight, lipids, glycogen, and nitrogen showed that the latter is a larger mosquito with significantly greater reserves of nutritive material. In the female *molestus*, part of these reserves are utilized in the formation of autogenous eggs. The present study suggests that the accumulation of these reserves is a physiological function shared by both females and males, and is independent of the mechanism involved in autogenous egg development."

[See also this *Bulletin*, 1957, v. 54, 1249.]

Cervone, L. Sulla presenza di *Culex* (*Neoculex*) *martinii* Medschid in provincia di Latina e contributo alla conoscenza della specie. [**On the Presence of *Culex* (*Neoculex*) *martinii* Medschid in the Province of Latina and Addition to the Knowledge of the Species**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1958, v. 21, Pt. 6, 539–51, 6 figs. (4 on pl.). English summary (8 lines).

Williams, M. C., Weitz, B. & McClelland, G. A. H. **Natural Hosts of some Species of *Taeniorhynchus* Lynch Arribalzaga (Diptera, Culicidae) collected in Uganda, as determined by the Precipitin Test.** *Ann. Trop. Med. & Parasit.* 1958, July, v. 52, No. 2, 186–90. [10 refs.]

Precipitin tests of the blood meals of 5 species of *Taeniorhynchus*, subgenus *Coquillettidia*, captured in the Zika and Lunyo Forests, Entebbe, Uganda, showed that most meals (94% of 850 meals) were from birds. *T. aurites* (78 blood meals identified) and *T. maculipennis* (104 blood meals identified) had fed exclusively on birds. In *T. pseudoconopas* 4 out of 337 mosquitoes had fed on primates, the rest on birds; in *T. metallicus* 1 out of 106 mosquitoes had fed on primates, the rest on birds; and in *T. fraseri*, in addition to 179 specimens which had fed on birds, 4 had fed on primates, 1 on reptiles, and 1 specimen gave a positive reaction for both bird and primate blood.

T. fuscopennatus showed a different pattern of feeding, as 29 out of 44 identified blood meals were from primates, 6 only from birds, and 9 from cattle, but the small sample of meals identified may not be representative.

In these tests a higher percentage of negative results was obtained with darker [digested] blood. The authors point out that negative results of precipitin tests may be due to the quality of the sample blood meal, and that negative results do not always mean that meals have been obtained from hosts outside the range of antisera used. *B. R. Laurence*

Surtees, G. **Notes on the Breeding Habits of some Culicine Mosquitoes (Diptera: Culicidae) in Southern Ghana.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1958, June 30, v. 33, Pt. 4/6, 88–92. [11 refs.]

During a survey in the rainy season of 1956 at Tafo in southern Ghana [a locality composed of (i) a cocoa plantation, (ii) some ground alongside a reservoir, and (iii) two residential areas], information was collected on the breeding habits of 19 culicine species. Each was shown to have a well-defined breeding area and a preference for a particular type of breeding site.

Aëdes aegypti was notably absent. On only one occasion were larvae found and then in a rock pool in the centre of the cocoa plantation. *Aëdes simpsoni* was frequently found in the residential areas where it was the commonest species. *Eretmapodites chrysogaster* and *Uranotaenia ornata* were the dominant species in the cocoa plantation and reservoir areas respectively. The greatest variety of species was found in the cocoa plantation. *R. J. Wood*

Nakagawa, P. Y. & Mikuni, R. T. **Mosquitoes and their Control in the Territory of Hawaii.** *Mosquito News.* 1958, June, v. 18, No. 2, 125–7.

Mosquito-control methods have been used in Hawaii since 1902 when *Gambusia* fish were introduced from Texas. There are only three species of biting mosquito in the islands, *Aëdes aegypti*, *Aëdes albopictus* and *Culex quinquefasciatus* [= *fatigans*] but all three are well-known vectors of disease. *Aëdes aegypti* is highly domesticated and is usually restricted to the warmer, drier parts. It has apparently been eradicated from the island of Oahu. *Aëdes albopictus* is widely distributed and breeds in artificial containers, tree and rock holes, and in water in the leaves of plants. *C. fatigans* is the most abundant and troublesome species, and breeds especially in sewage effluents and in the drains of pig and dairy farms. There has been no case, so far as is known, of locally acquired filariasis, but an outbreak of dengue in 1943–44 [this *Bulletin*, 1944, v. 41, 844, 845] stimulated the development of anti-mosquito control measures. In addition to the three biting species, four species of non-biting *Toxorhynchites* have been introduced, in 1929, 1950 and 1953, for the biological control of *Aëdes albopictus*. Since 1939, 32 species of mosquito, including 6 species of *Anopheles*, have been found on aircraft landing at Honolulu. *B. R. Laurence*

Brooke, J. P. **The Stabilization of Pyrethrins by Piperonyl Butoxide in Water, with special reference to their Use as Mosquito Larvicides.** *Ann. Applied Biol.* 1958, June, v. 46, No. 2, 254–9, 1 fig.

Although commonly used as a mosquito larvicide, pyrethrum has the serious disadvantage of being less persistent than DDT, gamma BHC and

similar insecticides. In experiments with larvae of *Aëdes aegypti* it was demonstrated that piperonyl butoxide, while also having a synergic effect, greatly prolonged the effective life of pyrethrins. When it was used in the form of an emulsifiable concentrate, the most effective proportions were 0·43 parts of pyrethrins with 4·3 parts of piperonyl butoxide per million parts of water.

The drinking water supplies where *A. aegypti* breeds are frequently replenished, and a reservoir of insecticide in the storage container is desirable. Experiments with polythene sachets and briquettes have shown the latter to be more effective. The presence of mud had a degrading effect on all formulations used. *R. J. Wood*

Rogers, A. J. & Rathburn, C. B., Jr. **Aerosol Tests with DDT and Malathion comparing Five Species of Mosquitoes and comparing Salt-Marsh** *Aedes* **from Eight Localities in Florida and Georgia.** *Mosquito News.* 1958, June, v. 18, No. 2, 74–80, 2 figs.

Early in 1957, adult *Aëdes taeniorhynchus* collected from several areas of Florida and Georgia were tested with aerosols of technical DDT and malathion used at concentrations of 10 oz. and 8 oz. per gallon of No. 2 diesel oil respectively, *i.e.*, 0·37 and 0·30 lb. per acre over a swath of 330 feet.

The results indicated that, whereas malathion was equally effective to them all (55–100% kill), the susceptibilities to DDT fell into two significantly different groups. When other species were tested, DDT had a greater effect on *Aëdes aegypti*, *Anopheles quadrimaculatus* and *Psorophora confinnis* than on *Aëdes taeniorhynchus* or *Culex quinquefasciatus* [*fatigans*]. The kills with malathion were again uniformly high.

Taking all tests into consideration, a much better kill was obtained with malathion in spite of the fact that DDT was used at concentrations higher than is usual in control operations. *R. J. Wood*

Rogers, A. J. & Rathburn, C. B., Jr. **Tests with a New Granular Paris Green Formulation against** *Aedes*, *Anopheles*, **and** *Psorophora* **Larvae.** *Mosquito News.* 1958, June, v. 18, No. 2, 89–93.

The effectiveness of various water-miscible stickers in holding Paris green on to vermiculite granules and the larvicidal action of the best of these formulations against *Aëdes taeniorhynchus* have been evaluated in the laboratory. The most promising formulation, ERC larvicide No. 1, was later used in field tests, where it was found to be very effective at a dosage of 0·45–0·60 lb. of actual Paris green per acre (*i.e.*, 3 lb./acre of formulation) against larvae of *Aëdes taeniorhynchus*, *Anopheles bradleyi* and *Psorophora confinnis*. *R. J. Wood*

Abonnenc, E. & Le Gac, P. Phlébotomes du Togo français. [*Phlebotomus* **Species in Togoland, French West Africa**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 334–7, 1 fig. [11 refs.]

Le Gac, P. & Abonnenc, E. Phlébotomes de l'Oubangui-Chari. [*Phlebotomus* **Species in Ubangui-Chari, French Equatorial Africa**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 337–41, 1 fig.

Vargas, L. & Díaz Nájera, A. Simúlidos mexicanos. [**Mexican Simuliids**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1957, Dec., v. 17, No. 4, 143–399, 68 pls.

Over 500 line drawings illustrate the keys provided in this systematic work for adult females and males and for the pupae of the simuliids of Mexico. Distribution is tabulated in detail. Only the following new species are described in the text: *Simulium gorirossii*, *S. johnsoni*, *S. juarezi* and *S. menchacai*. The male, female, larva and pupa are described, with the exception of the larva of *S. johnsoni* and *S. juarezi*.

D. S. Bertram

Rivosecchi, L. Gli organi della riproduzione in *Musca domestica*. [**The Generative Organs of** *Musca domestica*] *Rendiconti Istituto Superiore di Sanità*. Rome. 1958, v. 21, Pts. 4/5, 458–88, 6 pls. & 9 figs. [34 refs.] English summary (3 lines).

Fisk, F. W. **Toxicity of BHC in Milk to House Flies as related to Butter Fat Content of the Milk.** *J. Econom. Entom.* 1958, Aug., v. 51, No. 4, 560–61.

Schoof, H. F. & Kilpatrick, J. W. **House Fly Resistance to Organophosphorus Compounds in Arizona and Georgia.** *J. Econom. Entom.* 1958, Aug., v. 51, No. 4, 546.

Fay, R. W., Kilpatrick, J. W. & Morris, G. C., Jr. **Malathion Resistance Studies on the House Fly.** *J. Econom. Entom.* 1958, Aug., v. 51, No. 4, 452–3.

"Malathion resistance in house fly (*Musca domestica* L.) strains from Phoenix, Arizona, and Savannah, Georgia, was confirmed in laboratory tests during the fall of 1956. Physiological resistance was shown using exposures to malathion-sugar residual applications and topical applications of malathion-acetone solutions. Using colony cages with 5, 25, and 45% of the available resting surface treated with malathion-sugar residual deposits, strains with higher levels of resistance were selected from the resistant field strain. The physiologically resistant strains also showed a correlated behavioristic resistance in their avoidance of malathion baits but not of Dipterex baits. Comparison of resistance levels of 1-, 3-, and 5-day-old adult males and females showed a marked inverse relationship of age to resistance."

GREGOR, F. & POVOLNÝ, D. Versuch einer Klassifikation der syanthropen Fliegen (Diptera). [**Attempts at Classification of Syanthropic Flies**] *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1958, v. 2, No. 2, 205–16, 2 figs. [14 refs.]

THORSTEINSON, A. J. **The Orientation of Horse Flies and Deer Flies (Tabanidae, Diptera): I. The Attractance of Heat to Tabanids** *Entomologia Exper. et Applicata.* Amsterdam. 1958, Aug., v. 1, No. 3, 191–6, 1 fig.

SASA, M. **Notes on the Effect of Carbon Dioxide in the Breath as the Stimulant on the Flea,** *Ctenocephalides canis* **(Curtis, 1826).** *Japanese J. Exper. Med.* 1957, Dec., v. 27, No. 6, 401–10. [10 refs.]

The author and his colleagues have studied the nature of the stimuli activating several species of trombiculid mite and the tropical rat mite [this *Bulletin*, 1958, v. 55, 143, 385 and 463]. Similar studies are now reported for the dog flea, *Ctenocephalides canis*, similar apparatus being used but modified to suit this insect. The fleas were spontaneously active in the evening but, unless activated, usually remained quiescent in daylight. They were then activated to move and jump by human breath, and by carbon dioxide, but more than a 25% concentration of carbon dioxide was narcotic. Carbon dioxide was more a stimulus to jumping and crawling than an attractant. Other emanations of the host are thought to be attractants. Various vibrations are reported not to activate quiescent fleas, although they increase the agitation and movement of already active fleas. Avoidance of heat and of certain chemical vapours was observed. [The range of several of the stimuli tested is not defined precisely.] *D. S. Bertram*

HOOGSTRAAL, H. **Notes on African** *Haemaphysalis* **Ticks. IV. Description of Egyptian Populations of the Yellow Dog-Tick,** *H. leachii leachii* **(Audouin, 1827) (Ixodoidea, Ixodidae).** *J. Parasitology.* 1958, Oct., v. 44, No. 5, 548–58, 27 figs.

MISCELLANEOUS PAPERS

GEBER, M. & DEAN, R. F. A. **Psychomotor Development in African Children: the Effects of Social Class and the Need for Improved Tests.** *Bull. World Health Organization.* Geneva. 1958, v. 18, No. 3, 471–6.

Previous investigation [this *Bulletin*, 1958, v. 55, 464] has shown that Ganda babies are precocious by European standards, but that this precocity is followed by retardation at 1–2 years.

The present work shows that the babies of the more prosperous and better educated families of the same Ganda stock behave more like their European contemporaries and do not show the subsequent retardation.

The authors suggest that the precocious neuro-muscular development of the babies of the "poor" African families in Kampala may in part be due to the relaxed and complacent attitude of the mother towards her pregnancy. "A comparison of the effects of acceptance of pregnancy and relaxation during it, and of their opposites, on the state of the child at birth, is another of the many studies that could be made well in the changing circumstances of modern Africa."

The present accepted tests for child development are found to be unsatisfactory.

[The tests for the neuro-muscular development of the neonate are only significant if they are performed within an hour or two of birth. The amount of handling a baby gets may have a profound effect on early development.

The "relaxed" attitude towards pregnancy may not be the only or the most important factor differentiating reproduction in the "rich" from that in "poor" families. Activity may show very marked difference both in kind and in degree, and so may nutrition.] *Cicely D. Williams*

Politzer, W. M. & Tucker, Barbara. **Urinary 17-Ketosteroid and 17-Ketogenic Steroid Excretion in South African Bantu.** *Lancet.* 1958, Oct. 11, 778–9. [11 refs.]

"Urinary 17-ketosteroid and 17-ketogenic steroid values were determined in 50 outwardly healthy South African Bantu and in 20 Whites.

"There was no significant difference in 17-ketosteroid excretion; but excretion of ketogenic steroids was significantly lower in Bantu men. The reason for this is not clear."

BOOK REVIEWS

Nitzulescu, Virgil. **Elemente de parazitologie. I.** [Elements of Parasitology] 454 pp., 250 figs. 1955. Bucharest: Institutul de Medicină şi Farmacie Bucureşti.

In the present work the author gives an elementary and general account of protozoology and helminthology, which represents the first of 2 volumes on medical parasitology, the second of which will be devoted to medical entomology and mycology. The material is treated from the point of view of the medical student; the biological aspects of the subject are stressed, with particular emphasis on problems of phylogeny and adaptation, and considerations of pathogenesis and treatment are relegated to a

subsidiary position. The text contains many line drawings, nearly all of which have been copied from standard works, always with due reference to the authority concerned. *D. J. Bauer*

EAST AFRICAN TRYPANOSOMIASIS RESEARCH ORGANIZATION. **A Field Key to the Savanna Genera and Species of Trees, Shrubs and Climbing Plants of Tanganyika Territory. Part I: Genera and some Species** [BURTT, B. D.]. 2nd Edition revised by J. R. WELCH. pp. xvii + 58. 1957. Dar es Salaam: Govt. Printer. [Shs. 5/50.]

This is a second and revised edition of the book reviewed in this *Bulletin*, 1940, v. 37, 684.

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